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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR STEEL TREATING

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SUCCESS OF WESTERN SHOW, CONGRESS ASSURED

CIVIC LEADERS WILL WELCOME CONGRESS

Governor Heads Californians Greeting Visiting Metal Men

The Bay district is becoming thoroughly aroused to the importance of the coming Western Metal Congress and Western Metal and Machinery Exposition to be held in the Civic Auditorium in San Francisco the week of February 16.

They recognize that it is a great educational proposition and as such is deserving of their hearty support and cooperation and that it further will mark an impetus in the industrial relationship existing between the manufacturer and consumer in this territory.

The outstanding men in this territory are aroused to the importance of the metal and manufacturing industry in this region and are particularly anxious that all eastern manufacturers participating in the exposition and those attendance at the congress shall receive an impression of San Francisco in its true light.

Consequently they have organized a Citizens General Reception Committee headed by the governor of the state, Hon. James Rolph, Jr., and composed of the outstanding industrial and professional leaders of San Francisco and its environs.

List herewith:

Honorary chairman, James Rolph, Jr., Governor of California; chairman, Joseph T. Tynan, vice-president, Bethlehem Steel Co.; vice-chairman, R. E. Fisher, vice-president, Pacific Gas and Electric Co.

Members: T. P. Andrews, capitalist; F. J. Behneman, president, Joshua Hendy Iron Works; A. H. Brawner, Fuller Paint Co., chairman, Industrial Committee, Junior Chamber of Commerce.

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Frank Drake, Johnson Gear Co.; W. E. Emmett, field engineer, American Institute of Steel Construction; Mortimer Fleishhacker, president, Anglo-California Trust Co.; Marshal Hale, Hale Bros., Inc., president. Downtown Association.

J. Emmett Hayden, supervisor, City and County of San Francisco; L. O. Head, vice-president, San Francisco Chamber of Commerce; M. D. Heitmuller, manager, C. W. Marwedel Co.; Wm. F. Humphrey, president, Associated Oil Co.

Jefferson E. Peyser, supervisor, City and County of San Francisco; Ivan Johnson, works manager, Best Steel Casting Co.; Halsey E. Manwaring, manager, Palace Hotel; L. H. Marks, president, Retail Merchants Association; James H. McCabe, manager, St. Francis Hotel.

Hugh K. McKevitt, attorney; Dr. Elmer P. Norwall; M. M. O'Shaughnessy, city engineer, San Francisco; Angelo J. Rossi, supervisor, City and County of San Francisco.

Paul Shoup, president, Southern Pacific Railroad Co.; George D. Smith, owner, Mark Hopkins Hotel; Kenneth H. Smitten, real estate broker; J. H. Threlkeld, president, Junior Chamber of Commerce.

CHAPTERS OFFERED MOVIES

Lincoln Electric Co. Has Three Films, Each In Three Reels, On Arc Welds

The Lincoln Electric Co., P. O. Box 683, Cleveland, offers three moving picture films to A. S. S. T. chapters who wish to use them at future meetings.

One is entitled "Modern Manufacturing with a Stable Arc Welder." It has three reels and may be shown in 35 or 40 minutes. This subject is available in either the 16 or 35 mm. size.

Two other films are available only in the smaller size, but each has three reels and requires 35 or 40 minutes' showing time. One pictures the welding of the new Upper Carnegie Building in Cleveland, and the other deals with arc welding in pipe line work in Texas, Oklahoma and Mexico.

East meets west in preparation for the Western Metal Congress. W. H. Eisenman, secretary of the A. S. S. T., is shown above in conference with a committee of leading San Francisco metal men who are working hard for the success of the forthcoming Western Metal Congress and Western Metal and Machinery Exposition. Left to right, seated: Harold E. Gray, Pacific Coast Steel Corp., chairman Entertainment Committee; W. H. Eisenman, secretary, A.S.S.T.; James V. Coulter, Earle M. Jorgensen Steel Co., chairman Exhibit Committee. Standing, left to right: S. Craig Alexander, Tay Holbrook, Inc., chairman Attendance Committee; Andrew Carrigan, Jr., Republic Steel Corp., member Exhibit Committee; and John R. Gearhart, John R. Gearhart Co., chairman Plant Inspection Committee.

R. & H. CO. HOLDS THREE-DAY SHOW IN SAFETY CAMPAIGN

Theatre Filled at All Sessions

"Accidents in plants do not simply happen. They are generally the result of one of two causes: either unsafe conditions in the plant or a careless attitude of the employees", said L. M. White, assistant superintendent of the Roessler and Hasslacher Chemical Co., Niagara Falls, in addressing employees and their families at the company's Safety Show.

The show, held in the specially-chartered Capitol Theatre, Dec. 16, 17 and 18, was featured by a special safety program. Motion pictures were shown and awards made of silver cups and certificates to winning departments.

The theater, with a capacity of 1200, was packed at all the programs. The interest in the subject matter of the safety pictures and program was demonstrated by the extreme quiet during the presentation.

Comedies, news reels and other short pictures were interposed between the safety movies. Further emphasis on safety was given by the doctor in charge of First Aid at the plant, who spoke briefly on the application of first aid in ordinary accidents. This was followed by a practical demonstration by the plant doctor and his assistants and the members of one of the R. & H. first aid teams.

U. OF MISSOURI AND MINES BUREAU OFFER FELLOWSHIPS

Offer Four, Worth $800 Each

Four fellowships at the School of Mines and Metallurgy of the University of Missouri and the Mississippi Valley Experiment Station of the U. S. Bureau of Mines will soon be granted, according to an announcement from the school's director.

The income from each fellowship amounts to $800 for ten months, beginning Sept. 1, 1931. Qualifications include the possession of a B. S. degree, or its equivalent, and proper training in mining, metallurgy or chemistry.

Applications accompanied by a certified copy of collegiate record, statement of professional experience and the names and addresses of three references will be received until June 15. The applications should be addressed to the director, School of Mines and Metallurgy, University, of Missouri, at Rolla, Mo.

E. C. BLACK NOW IN LOS ANGELES

Los Angeles is the new home of E. C. Black, former member of the Chicago chapter, who has resigned his position as metallurgist for the Edward Valve and Mfg. Co., of East Chicago, Ind., to become Southwestern Representative for the Moon Truck Co., of Chicago, Ill.

FEBRUARY "METAL PROGRESS" ABSTRACTS WESTERN PAPERS

The eyes of the A. S. S. T. will be turned, figuratively speaking, toward the Pacific Coast during the month of February. The Western Metal Congress and the Western Metal and Machinery Exposition, which will be held in San Francisco the week of February 16, are of prime importance not only to those who live or do business on the west coast but also to all members of the A. S. S. T.

Metal Progress for February will therefore feature these outstanding events and most of the articles which will be printed in next month's issue will be extended abstracts of papers which will be presented at that time.

President J. M. Watson of the A. S. S. T. will appear before the Western Congress to present a paper on automotive steels, written against his background of experience in the automotive industry. His paper will be one of those appearing in *Metal Progress* next month. Dr. C. H. Herty, Jr. of the Bureau of Mines Experiment Station at Pittsburgh has prepared a paper on steel manufacture which is sure to prove of great practical interest to many members, and *Metal Progress* will take pleasure in presenting this paper next month.

High test cast iron, a subject of prime interest to metallurgists, will be thoroughly covered in an article by F. B. Coyle of the International Nickel Co. Of equal interest are the chromium and chromium-nickel steels which are daily finding wider commercial use. C. C. Snyder, metallurgist for the Republic Steel Corp., will contribute a scholarly discussion of the metallurgy and practical application of these alloy steels.

Welding structural steel is drawing comment not only from business papers but also from daily newspapers and general circulation magazines because of its newness. Vice-President A. F. Davis of the Lincoln Electric Co. has prepared a history of structural welding which not only records the past and present but also peeps into the future, and this will be one of the leading articles in February's *Metal Progress*. James H. Knapp of Los Angeles has written a clear description of a new type of nitriding furnace. The timeliness of this subject is apparent and

Continued on Page Four

SUCCESSFUL WESTERN METAL CONGRESS AND EXPOSITION IS ASSURED AS PLANS MATURE

Attendance of 50,000 at Show and 5,000 at the Technical Sessions Predicted for the West's Second Such Event

Many industrial plants in the western states will run without any executive heads on the job the third week in February. A migration to San Francisco is in view, for the National Western Metal Congress and the National Western Metal and Machinery Exposition will be held in the Civic Auditorium there February sixteenth through the twentieth.

Probably 50,000 interested persons will visit the exposition, while 5,000 are expected at the convention. Both of these affairs are forecast to exceed to a great extent the success of the similar events, held two years ago in Los Angeles, when the congress and exposition took place for the first time on the Pacific slope.

All the 1930 officers of the American Society for Steel Treating will be present at the coming event and will have executive authority. They are programmed to deliver talks, which are expected to raise the standards of metallurgy and machinery throughout the country.

With programs already arranged and subjects of the different talks chosen, Society officials have been paying close attention during the last several weeks to arrangements for the exposition, which will occupy 70,000 square feet of floor space in a hall alongside the convention chamber.

One concern plans to show a 1931 model micro-metallograph with new type microscope and arc lamp, grinding and polishing machines, metallurgical workshop microscopes with photographic attachments, a microscope for examination of colloidal solutions, low power binocular microscopes for examination of fractures and a universal colorimeter for chemical analysis.

Another firm plans demonstrating application of welded-on overlays or hard facings, as well as developments in metallic diamond substitutes.

Mechanical oxy-acetylene cutting equipment, camegraph, radiagraph and oxygraph, as well as acetylene generators, oxygen manifolds and a complete assortment of latest welding and cutting torch equipment and supplies will be found in another display.

Automatic hacksaw machines, using high speed steel saws, and a portable hacksaw machine will constitute interesting features of a Detroit company's booth, while welding and cutting torches in all sizes, pressure regulators, manifolds and gas generators will be featured in another one.

Electric trucks under power and capable of being operated within the limited space of a single booth in the show is the promise of a San Francisco concern. A Massachusetts establishment plans showing grinding wheels, high speed grinding equipment and refractories.

Twist drills, reamers, taps, milling cutters, drill chucks and special small tools, will make an interesting display, while abrasive and refractory products of a prominent grinding wheel company, together with electric heating equipment, will be found in another.

Compressors, used for supplying air in connection with oil and gas burning industrial furnaces, foundry cupolas, machines to deliver air for furnaces,

Continued on Page Four

6300 MARK PASSED AS A.S.S.T ROSTER CONTINUES INCREASES

Membership Largest in History

The last month of 1930 saw the A. S. S. T. membership register a net gain of 55, which brought the total to 6306 on January 1, 1931. This is the largest number of members ever to be registered on the Society's books.

In group 1, the New York chapter climbed into fifth place ahead of Philadelphia for the only change of the month in that group. In group 2 there was a decided upset when both Syracuse and Indianapolis passed Dayton in the standings. Group 3 showed no change.

The chapter standing at the opening of the new year was:

1.

Chicago	550
Pittsburgh	484
Detroit	478
Cleveland	397
New York	360
Philadelphia	356
Boston	279

2.

New Jersey	275
Los Angeles	253
Golden Gate	171
Hartford	162
Milwaukee	150
Lehigh Valley	141
Buffalo	125
Montreal	120
Cincinnati	118
Canton-Mass.	104
St. Louis	101
Syracuse	83
Indianapolis	80
Dayton	78
North-West	65

3.

Ontario	139
New Haven	116
Tri-City	105
Worcester	96
Washington	92
Schenectady	83
Rochester	76
Rhode Island	76
York	65
Columbus	62
Rockford	57
Southern Tier	50
Springfield	48
Notre Dame	33
Fort Wayne	21

LOS ANGELES HAS OIL SHOW

Oil Equipment and Engineering Show Will be Held Week of March 16

Keen interest is being displayed throughout the oil industry in the second annual Oil Equipment and Engineering Exposition which will be held in Los Angeles from March 16 to 22. This display of tools and machinery being used in the drilling, production, transportation and refining branches has a greater significance this year because it will be the only oil exposition to be held in 1931.

Added attractions which offer great benefit to both the oil men and the manufacturers are the new buildings which have been erected for the purpose. Every modern facility has been provided to exhibit equipment under ideal conditions and to give the visitor the opportunity to see the latest designs in tools and machinery in a way most beneficial to him.

The appearance of the buildings and grounds have even been given the most careful consideration and the pleasing surroundings provided will do much to increase the pleasure of the visitors.

R F. MEHL TALKS ON PRECIPITATION

R. F. Mehl, superintendent of the division of physical metallurgy at the Naval Research Laboratory in Washington, addressed the Cincinnati chapter of the American Chemical Society on the subject of "Precipitation from Solid Solutions" on January 14.

GRAHAM IN NEW CONNECTION

Appointed Technical Director of the Caskey Brass & Bronze Works

Walter F. Graham, since 1919 a member of the A. S. S. T., has been appointed technical director of the Caskey Brass & Bronze Works, Inc., Philadelphia, agents of the International Nickel Co. and producers of nickel, nickel alloy and special non-ferrous castings.

Mr. Graham wrote a number of papers on foundry practice while in charge of the Technical Division of the Ohio Brass Co. Some years ago he developed and patented Everbrite metal, a nickel-copper alloy, and in this connection served as chief metallurgist of the American Mond Nickel Company.

THE REVIEW

Devoted to the interests of the American Society for Steel Treating

A Review of the Activities of the Chapters and National Organization of the A. S. S. T.

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RAY T. BAYLESS ..... *Editor*
JOHN G. MAPES ..... *Managing Editor*

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"TRANSACTIONS" RINGS THE BELL AGAIN

Bound volumes of the *Transactions* have been mailed to the thousands of men who ordered them. The book is a complete record of the technical activities of the A. S. S. T. in the last six months of 1930. Nearly 1300 pages are required for the presentation of the 50-odd papers which were presented before the national convention of the Society last September or were deemed worthy by the publication committee of presentation through *Transactions.*

Men in the metal world have grown accustomed to awaiting eagerly the publication of the bound volumes of the *Transactions* of the A. S. S. T. because experience has shown them that here is a truly useful compendium of recent progress in the field of practical metallurgy.

The Society takes pardonable pride in the fact that the criticisms already received on the latest *Transactions* indicate that this volume is not only up to the standards of its predecessors, but even exceeds them in breadth of field and value of imparted information. A glance at the table of contents reveals, among other things, an array of the names of many, if not most, of the metallurgical leaders of this country. The subjects written and discussed, range from the purely theoretical to the highly practical and cover and include all the way stations between those points.

But *Transactions* is essentially technical and its field is not invaded by either *Metal Progress* or THE REVIEW. Offtimes *Metal Progress* serves as a medium for the immediate presentation, in somewhat abstracted form, of important technical papers, such as Dr. Grossmann's 1930 Campbell lecture, which was published in the November issue of *Metal Progress*, and republished completely in the *Transactions* appearing January first. No one of the A. S. S. T. publications rivals another, but each supplements the other, as is evidenced by this particular illustration. Where *Metal Progress* offers speed and accuracy, *Transactions* offers completeness and accuracy.

The publication of the next *Transactions* will undoubtedly bring before the Society, and before all others who are interested, papers of a merit equal to those published this month. *Metal Progress* in the A. S. S. T. stands not only for the name of its official monthly publication but also represents the ideal behind the Society's services.

BIG THINGS WILL HAPPEN SOON

There will be big doings out on the West coast next month, and fortunate is the metal man who registers at the second Western Metal Congress sponsored by the Society.

Because of such uncompromising things as deadlines and publication dates, THE REVIEW has to devote its January issue to the Western Metal Congress and the Western Metal and Machinery Exposition, even though these events do not take place until the week of February 16. In the month that will pass between publication of this newspaper and the opening of the Congress and Exposition, many things can happen, not the least probable of which is that the Congress and Exposition will be forgotten by the thousands of A. S. S. T. members who live east of the Rocky Mountains.

Out on the coast, they won't forget the convention and show for many months after the last technical paper has been read and the last exhibitor has packed his display and gone to other and not so pleasant climatically cities.

The whole of California is attractive in so far as pleasure is concerned and San Francisco will be many times more alluring than usual the week of February 16 to those who are interested in metals.

COUNTRY NEWSPAPER STLYE

In one respect, at least, THE REVIEW is somewhat disappointing to its editors and possibly is equally so to a good many of its readers. There aren't enough personal notes about members of the Society.

We would like to run columns of little items, as interesting and intimate as those which raise the average country newspaper to a position of real value in its community. Twice before has THE REVIEW asked for personal items and twice before have its most fervent requests been answered with only a few contributions.

Where are you going on your vacation next summer? Have you recently become a husband, a father? Have you visited any interesting plants recently? Or have you anything at all that might interest your fellow members. We want this newspaper read, and from our own experience we do not know of anything more conducive to reader interest in a newspaper than a lot of human, personal items about the reader.

LIKES PUBLICATION SYSTEM OF A.S.S.T.

Member Tells Editor That the Three Periodicals Are Good

Editor, THE REVIEW:

Your monthly newspaper seems to me to be the best medium through which I can clap my hands for *Metal Progress*, *Transactions*, and THE REVIEW.

In the editorial columns of THE REVIEW, you have mentioned more than once the advantages of having three such publications, but I wonder if you know just how concrete those advantages are to A. S. S. T. men. I am a metallurgist, as are many of my fellow members. My work is not research, but is more along control lines. Nevertheless, I am interested in a good percentage of the articles which *Transactions* used to publish monthly and now does in bound volume. Such articles as most of those, I consider of professional value and I have no hesitancy whatsoever in reading them in my laboratory, for I feel that when I select a *Transactions* article for reading, my organization receives enough benefit from the reading thereof to more than compensate for the time I spend.

THE REVIEW, of course, is a home newspaper, to be read near the fireside in the comfort of one's home. You send THE REVIEW to my business address, but I can state honestly that I have yet to fail to carry it home with me the evening it arrives, and only on one or two occasions have I missed reading it that very night.

Metal Progress cannot be definitely classified yet as either a publication for home or office consumption. Such articles as those on the R-101, the kitchen equipment at the Cleveland Terminal, and the manufacture of metal toys are strictly pleasure reading, for me, anyway. But on the other hand, *Metal Progress* published a story on furnace design in one of its early issues that could not fail to be of dollar and cents value to any man in the metal industry who is at all interested in the subject of furnaces. Another article which was really valuable to me was the article on gear steel selection.

Being more or less of an honest man, and being a very busy one, I am forced to be discreet in my choice of trade publications which I read during my working hours. I would say, after due consideration, that I observe the following procedure when a new copy of *Metal Progress* reaches my desk. First I look at the cover to get my monthly aesthetic education. Then I run rather hurriedly through the pages to observe the latest in layout. Then I hunt for the full-page photographs in which I am always interested because of my own modest skill with a camera, and finally glance at the table of contents and at the page devoted to authors to see what articles I can conscientiously read then and there. After such articles have been selected and read, I carefully hide the magazine so that my co-workers don't make off with it before I go home that night.

Once the magazine is safe at my home, I relax my vigilance and spend the succeeding two or three evenings in reading the stories I did not read at the office, examining the advertisements carefully, and, in general, enjoying the finest professional publication I have ever had the pleasure of reading.

Incidentally, I am 100% for your present system of preprinting manuscripts accepted by the Publication Committee as soon as possible after acceptance. The announcement of these preprints in the columns of THE REVIEW makes them available to me, and, of course, to every other member, much more rapidly than would be otherwise possible.

With best wishes for continued success in A. S. S. T. undertakings, I remain

Yours very truly,
ALBERT E. GRIFFITHS.

NOTRE DAME HEARS STRAUSS TALK ON USE OF VANADIUM

Meets with Local A. C. S. Section

The Notre Dame group held a joint meeting with the St. Joseph Valley section of the American Chemical Society in Chemistry Hall at Notre Dame in the evening of Dec. 12.

Jerome Strauss, chief research engineer of the Vanadium Corporation of America, was the speaker; he chose as his subject "Vanadium in Industry." Mr. Strauss outlined the history and chemistry of the metal, the metallurgy of its ores, and some of the physical properties of a few of the vanadium alloy steels which are now being produced.

His talk was supplemented by a series of slides. Mr. Strauss' address made quite an impression upon his listeners as was evidenced by the lively discussion after he had finished. The Societies feel that they were fortunate in securing such an interesting speaker.

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DETROIT SPONSORS A SOCIAL MEETING BEFORE CHRISTMAS

Several Charter Members Present

By O. W. McMullan

The December meeting of the Detroit chapter was held in the Fort Shelby Hotel, Monday, Dec. 22.

Following the usual custom for a Christmas party, the meeting was a social one, and no technical talk was presented. A turkey dinner was followed by a couple of hours of entertainment and drawing for prizes.

The chapter was honored by the presence of several of the charter members of the Steel Treating Research Society from which the A. S. S. T. later sprung. Mr. William P. Woodside, who started the old society in 1914, introduced the old members. Among those present were Mr. Lawson, the first chairman; C. N. Dawe, the first editor and reader of a paper at the first meeting; and Herman Kiefer, who presented the second paper. Telegrams and letlers were received from old members unable to be present.

Col. A. E. White, the first national president of the present society, gave a few remarks indicating the growth of heat treatment over that of twelve years ago.

PHILA. MEN HOLD TOOLS SYMPOSIUM

Members Give Papers and Join in Tool Problem Discussion

By Adolph O. Schafer

The third regular meeting of the Philadelphia chapter was held on Friday, Nov. 21st, at the Engineers' Club. The meeting was preceded by a dinner attended by 65 members and guests. During the coffee and cigar period, Mr. John Owen Clark delivered a talk on "The Head Hunters of Formosa." Mr. Clark, who is at present employed by The Midvale Company, was at one time a teacher in a Japanese university, and has travelled extensively about the Pacific.

The evening was devoted to a general discussion of "Tool Problems", with a program of speakers drawn from the chapter.

The first speaker was Theodore A. Wiedemann, who had as his subject "Practical Hints on Heat Treating". He talked of the importance of communicating all of the information on a job to the tool designer and the tool hardener so that each may do his best work. He further emphasized the importance of stamping every tool with the brand of steel from which it is made. In the line of tool problems he told of the trouble often caused by grinding cracks, and urged everyone to be sure to remove enough of the surfaces of tools. He recommended that high speed steel be heated up to sweating temperature quickly after the preheat. In closing he advised long soaking periods on the draw heat.

Mr. John Welsh followed and repeated the advice on long draws. He mentioned one case in which a set of dies drawn for 40 minutes gave 8 hours' service. The same dies gave 39 hours' service after an 8 hour draw. He also spoke of the importance of proper normalizing or annealing.

Dr. Boynton was reminded of the service record of dies used to press threads on the ends of bridge wires. Such dies lasted half a day after a ½ hour draw. When the draw was increased to 4 hours, the dies lasted about a week.

Mr. Parkison said that the quality of tool steels furnished by the steel manufacturer has improved considerably. However, since the cost of metal is such a small factor compared to the labor necessary to machine and treat it, he advised thorough inspection.

Mr. Lorenz told how long hosiery shear blades caused trouble by bowing in hardening, until it was discovered that they were quenching too near one side of the tank, so there was a slight difference in quenching effect on the two sides.

Mr. Adams read a paper on "Heat Treatment Strains". He divided the strains produced by heat treatment into two classes, — temporary and permanent. The permanent or residual strains may be of benefit in the service to which the piece is put. Temporary strains are produced by the temperature differential during heating and cooling and obtain only so long as the differential exists.

The permanent strains left in the piece are the reverse of the temporary strains and are the result of the plastic deformation produced by them. The metal is at first plastic, and temporary stresses above the yield point are relieved. The surface then becomes elastic on cooling. The magnitude of the permanent strains depends on the temperature distribution at this point. The matter is complicated by the expansion of the metal at the critical point resulting in the reversal of the stresses. A delayed quench, slow and uniform cooling from a temperature above the critical range on heating to above the AR point on cooling, before quenching helps minimize these strains.

Local stresses center about discontinuities of section, and are caused by sharp corners, notches, unbalanced sections, etc. The cooperation of the designer is needed to keep these low. Unequal quenching may be caused by poor agitation, bubbles, type of scale or the surface condition,—the smoothest surface is best.

Tempering reduces the residual stresses, but does not completely relieve them. Reactions are sluggish at drawing temperatures, and long holds are necessary for tempering to be effective.

Mr. Muller read a paper on "Furnace Atmospheres". The terms "oxidizing" and "reducing" as applied to furnace atmospheres are often misleading. In his talk "oxidizing" referred to such atmospheres as produce surface scale or oxide. Although discoloration takes place from 400° F. up, deoxidation and scaling is not rapid below 1100° F.

Besides the furnace atmosphere, time and temperature influence the rate of scaling. Carbon dioxide can be dissociated by heat depending on the partial pressure of the oxygen in the atmosphere and in the product. Reducing atmospheres are usually high in hydrogen or carbon monoxide.

MANY EXHIBITORS IN WESTERN SHOW

Over 110 Concerns Now Listed And Still More Are Expected

More than 110 companies in many different lines of the metal industry will be represented at the Western Metal and Machinery Exposition to be held in San Francisco's Civic Auditorium

Since a month will elapse between the time that this list was made up and the opening date of the Exposition, it is expected that a good many more firms will be added to this list.

The participating firms
Air Reduction Sales Co.
Ajax Electrothermic Corp.
Allegheny Steel Co.
American Car & Foundry Co.
American Gas Furnace Co.
American Machine & Foundry Co.
American Steel & Wire Co.
Armstrong Brothers
Babcock Co., C. B.
Babcock & Wilcox Co.
Barnes, W. O.
Bartley Crucible & Refractories Co.
Bausch & Lomb
Bethlehem Steel Co.
Black & Decker Mfg. Co.
Boston Gear Works Sales Co.
Boice, W. B. & John E.
Bond Foundry & Machine Co.
Botfield Refractories
W. J. Briggs Co.
Bristol Co.
Brown Bros. Welding Co.
California Saw Works
Carborundum Co.
Chicago Steel & Wire Co.
Chisholm-Moore Hoist Corp.
Clark Tructractor Co.
Cleveland Twist Drill
Columbia Steel Corp.
Crucible Steel Co. of America
Ding's Magnetic Separator
Dumore Co.
Eclipse Fuel and Engineering Co.
Electrical Refractories Co.
Elwell-Parker Electric Co.
Ferner Co., R. Y.
Fletcher, Joseph C.
Foley Manufacturing Co.
Fuels & Furnaces
Fusion Welding Corp.
Geometric Tool Co.
Globar Corp.
Hagan Co., George J.
Halcomb Steel Co.
Hall-Scott Motor Co.
Haskins Co., R. G.
Hauck Mfg. Co.
Hoover Mfg. Co.
Hoskins Mfg. Co.
Houghton & Co., E. F.
Illinois Steel Co.
Illinois Testing Labs.
Industrial Steel Treating Co.
International Molding Machine Co.
International Nickel Co.
Johnson Gas Appliance Co.
Jorgenson Steel Co., Earle M.
Knapp Co., James H.
Leeds & Northrup
Leitz, E.
Lincoln Electric Co.
Linde Air Products
Lindstrom, A. S.
Macleod Company
Marwedel, C. W.
Maxon Premix
Merco Nordstrom
Minneapolis-Honeywell Regulator Co.
Moore, C. C.
Morse Twist Drill & Machine Co.
National Tube Co.
Natural Gas Equipment, Inc.
New Britain Machine Co.
Norton Co.
Oakite Products, Inc.
Pacific Abrasive Co.
Pacific Coast Gas Association
Pacific Coast Steel Corp.
Pacific Factory
Pacific Foundry
Pacific Gear & Tool Works
Pacific Scientific Co.
Parker Appliance Co.
Perin, Ira C.
Procunier Safety Chuck Co.
Republic Steel Corp.
Riehle Bros. Testing Machine Co.
Royersford Foundry & Machine Co.
The Safety Grinding Wheel & Machine Co.
Schweitzer, A. M.
Shell Oil Co.
Spencer Turbine Co.
Spindler & Sauppe Co.
Standard Oil Co. of Calif.
Standard Pressed Steel Co.
Standard Tool Co.
Steel Publications
Sterling Wheelbarrow Co.
Stoody Co.
Strand & Co., N. A.
Taylor-Wharton
Taylor-Winfield
Timken Steel & Tube Co.
Union Mfg. Co.
U. S. Steel Products Co.
Victor Welding
Warner Engineering
Welding Engineer
Western Drop Forge Co.
Western Machinery World
Wilcox, E. A.
Wilson-Maeulen
Yuba Mfg. Co.
Zeiss, Inc., Carl

LOS ANGELES MACHINE TOOL DEALER HAS FINE QUARTERS

Immense Showroom a Feature

Machine tools are deemed worthy of a fine display on the west coast, as is evidenced by the accompanying photograph of the new quarters of Herberts Machinery Company, Ltd., on Santa Fe Avenue, Los Angeles.

The artistically modern and imposing entrance shown in the upper half of the photograph leads into perfectly lighted and arranged offices which are separated by glass partitions from the the immense show room in the rear, which is shown in the lower picture.

Hundreds of machine tools, all orderly arranged, are displayed on the floor. A 15-ton overhead crane expedites movement of machinery from the floor to the shipping platform. The Herberts display room is visited by hundreds of machinery users and other customers daily, and all are enthusiastic and laudatory about this splendid arrangement.

NEW YORK MEETING FEATURES DINNER AND LABORATORY TOUR

Union Carbide & Carbon Co. Host

By F. H. Clark

The December meeting of the New York chapter was held at the Union Carbide and Carbon Research Laboratories. The chapter members were guests at a dinner given by the company. The program for the evening consisted of a tour through the laboratories.

Many interesting demonstrations were shown in the various laboratories. Furnaces for nitriding were shown in operation together with many nitrided parts on exhibit. Hardness tests of nitrided cases by means of the microcharacter were also observed.

The metallographic laboratory pointed out new methods of polishing to reveal inclusions and the rapid polishing of soft metals such as lead and its alloys. An interesting demonstration was given of spectrographic methods for determining small quantities of metals present as impurities in other metals.

Demonstrations were given of different types of welding and stelliting. There were also exhibits of chromium steels in fabricated form and hastelloy, a corrosion resistant metal.

The chapter enjoyed the evening very much and appreciated the invitation from the Union Carbide and Carbon Laboratories.

INDUCTION FURNACE IS BOSTON TOPIC

H. C. Bigge, Speaker, Arouses Hearers to Keen Discussion

By H. E. Handy

About 200 members and guests attended the meeting of the Boston chapter held at Massachusetts Institute of Technology, Cambridge, on Friday, Dec. 5. Before the meeting a dinner in Walker Memorial was attended by ninety members, the guest of honor being Dr. Albert Sauveur, professor of metallurgy at Harvard University, who gave a short talk on his recent trip to Europe during which he attended the International Congress of Mining and Metallurgy, held at Liege, Belgium.

The guest speaker of the evening was H. C. Bigge, Bethlehem Steel Co., whose subject was "Melting Tool and Alloy Steels in the Ajax Coreless Induction Furnace". Mr. Bigge described in detail the Ajax Furnace installation and practice at the Bethlehem plant, and had numerous slides showing the equipment, materials used in the charge, together with the composition and metallographic properties of the resulting steel. Mr. Bigge explained that the induction method of melting should be considered a continuation of the crucible process and stated that it possessed all of the qualities enjoyed by the crucible process plus accurate temperature control.

A lively discussion followed the meeting, among those taking part being Dr. E. T. Northrup and A. R. Blakesley, vice-president and chief engineer of the Ajax Electrothermic Corp.; Captain S. B. Ritchie, Watertown Arsenal, and F. J. Blaney of the General Alloys Co. Mention was made of the fact that Watertown Arsenal had installed three furnaces of this type for melting gun steel, one of them, the largest in use anywhere, having about two tons capacity.

The meeting was presided over by the chairman, Dr. G. B. Waterhouse, professor of metallurgy at Massachusetts Institute of Technology.

MACHINE TOOL SHOWROOM

INTERESTING TALK PLEASES ONTARIO

Dr. Matthews Tells Unusual Behavior of Chrome Steels

By John W. McBean

At the meeting on Dec. 5 about seventy-five Ontario chapter members assembled for dinner in the King Edward Hotel, Toronto, every place being filled and others came in later to hear Dr. J. A. Matthews on "Corrosion Resistant Steels, Their Purposes and Use."

The speaker took up the composition of a considerable number of such steels, their treatment, limitations and uses, and brought out a number of unexpected characteristics. For instance, higher chromium which might be supposed to increase hardness and physical properties will in some cases have the opposite effect, although it will increase heat resistance.

One of the interesting and important features of some of these steels is the sudden drop in impact resistance in a sample reheated to about 1100° F., and this is also accompanied by a very marked decrease in corrosion resistance.

Dr. Matthews illustrated this in a very striking way by two samples from the same sheet which had been heat treated alike, except that the second one had been reheated to about 1200° F. Both samples were submitted to corrosion tests by dilute sulphuric acid and copper sulphate. The first specimen was unaffected, looked clean and gave the ordinary metallic ring when dropped. The second specimen, however, while it had not lost materially in weight, was entirely ruined and acted as though all the crystals were connected by hinges, having a free motion for a limited distance.

He also pointed out that while a uniformly cold worked 18-8 steel attains a great increase in hardness and strength and has a high corrosion resistance, such a steel with localized work will be subject to failure unless subjected to heat treatment after work.

The fact that corrosion resistance depends on various factors beside the composition of the steel was illustrated by samples. The steels with chromium only as an alloy are better for resisting copper sulphate than those with nickel.

ERECT A WINDOWLESS PLANT

New Simonds Saw & Steel Co. Building First of Its Kind In America

Witnessed by a gathering of over 500 spectators, including municipal officials and industrial leaders, the corner-stone of the first windowless factory, the ultra-modern plant of the Simonds Saw and Steel Co., was laid at Fitchburg, Mass., on Saturday, Dec. 20. This marks another decisive step in the advancement in industrial activities of one of the country's foremost organizations in the edge-tool field.

Thomas F. Howarth, vice-president, who on the same date observed his 50th anniversary as an employe and officer of the company, officiated.

Following introductory remarks by Hon. Joseph N. Carriere, mayor of Fitchburg, Mr. Howarth spoke briefly, referring to the establishment of the Simonds industries by Abel Simonds, 99 years ago. Mr. Howarth paid tribute to the late Daniel Simonds, under whose direction great advancement was made in the company's development.

HALCOMB MOVES DETROIT OFFICES

The Halcomb Steel Co. announces the removal of its Detroit offices and warehouses to a new building at 3233 Hubbard Ave., near Michigan. The telephone numbers are Lafayette 7075-6-7.

CHAPTER MEN ENJOY ALLOY STEEL PAPER

Succop Tells Canton-Massillon about Production, Treating

By R. G. Roshong

The Canton-Massillon chapter held its first local meeting at the Onesto Hotel on Dec. 3. Following the dinner M. P. Grady of the local Pennsylvania Railroad shops presented interesting bits of "round house philosophy", intermingled with poems and new Irish "nifties", which were thoroughly enjoyed by the members and guests.

J. A. Succop, chief research engineer of the Heppenstall Co., was the speaker at the technical session on the subject, "Alloy Steels; Their Production and Heat Treatment." His talk was opened by a discussion of the fundamentals governing the production of acid and basic open hearth steels, showing the advantages and disadvantages of adding the alloying elements in the furnace and at the ladle. The speaker considered it a distinct advantage to tumble the charge of base metals, to remove adhering rust, before melting. This practice, it was claimed, materially cuts down the loss of alloying elements by oxidation.

The manner of handling alloy steel ingots was also discussed. The ingots are stripped at approximately 1500° F. and immediately carried through subsequent heat treating and forming operations, thus the steel never becomes completely cooled. This procedure prevents rupture of the steel due to excessive shrinkage during uneven cooling of the ingot.

Mr. Succop also stated that the high frequency induction furnace was coming into greater use for the production of alloy tool steels. This type of furnace has some distinct advantages over other methods of melting, particularly with regard to time required for melting and minimum loss of alloying elements due to oxidation.

He also stated that the high frequency induction furnace was very useful in heat treating large die blocks. By this method of heating the center of the block comes up to heat at more nearly the same rate as the exterior, which minimizes distortion and chance of cracking.

LUDLUM STEEL CO. EXPANDS

Altering Watervliet Mill to Improve Production of Special Steels

H. G. Batcheller, recently elected president of Ludlum Steel Co., recently announced that the Watervliet mill of Ludlum is undergoing extensive alterations to improve its facilities for the production of the special steel introduced by this company in recent years.

Equipment for wire drawing, centerless grinding, heat treating and other finishing operations is being enlarged and modernized and rolling facilities for special shapes are being extended to supply the demand for non-corrosive steel where other materials have previously been used.

The carrying out of this program will entail considerable concentration of tool steel production at the Dunkirk mill and some re-arrangement of personnel at the various plants, but will permit of the concentration of equipment and supervision necessary for the development of both types of steel.

TITAN CO. ENLARGES BRASS MILL

The brass rod mill of the Titan Metal Manufacturing Co. at Bellefonte, Pa., is being enlarged to provide more adequate facilities for the manufacture of small brass rods and welding rods. The new mill is expected to be in operation by the first of March.

TENTATIVE WESTERN PAPERS ANNOUNCED

Subjects and Speakers Assure Western Congress Popularity

The tentative program of the Western Metal Congress has been received from the chairman of the San Francisco Program Committee, Howard S. Taylor. It is expected that a few changes will have to be made in this program as printed herewith, but in the majority of instances this list of papers and authors will be correct.

The program, arranged by sessions, is as follows:

Pacific Coast Gas Association

1. J. H. Knapp—James H. Knapp Company
   "Gas Furnace for Nitriding"
2. R. G. Guthrie—Peoples Gas Light & Coke Company
   "Carburizing Steel by Gas"
3. E. G. deCoriolis—Surface Combustion Company
   "Progress and Development of Fuel Fired Furnaces"
4. G. P. McNiff—National Tube Company
   "The Manufacture of Seamless Steel Tubing and Some of Its Properties"

American Welding Society—1st Session

1. Miles C. Smith—Stoody Corporation
   "Welding of Alloy Overlays" (title not definite)
2. W. H. Dunlap—Aluminum Company of America
   "Welding Aluminum and Its Alloys"
3. A paper by ???—Linde Air Products Company
   "Carburizing Flame in Acetylene Welding"

2nd Session

1. A. F. Davis—Lincoln Electric Company
   "Structural Arc Welding"
2. Mr. L. A. Stroebel—Stoody Corporation
   "Coated Electrodes"
3. J. C. Hodge—Babcock & Wilcox Company
   "Fusion Welding"

American Institute of Electrical Engineering and Pacific Coast Electrical Association (jointly)

1. G. E. Stolz—Westinghouse Electric & Mfg. Company
   "Electricity in the Steel Mill"
2. George W. Bernhard—Pacific Gas & Electric Company
   "The Use of Electricity in the Heat Treating of Steels"

American Institute of Mining and Metallurgical Engineers

1. J. Fenstermacher—Columbia Division of United States Steel Co.
   "Improvement in the Physical Characteristics in Large Carbon and Alloy Steel Castings"
2. Mr. Young—American Manganese Company
   "Manganese Steel"
3. C. H. Herty, Jr.—U. S. Bureau of Mines
   "Steel Manufacture"
4. F. B. Coyle—International Nickel Company
   "High Test Cast Iron"

American Chemical Society

1. F. N. Speller—National Tube Company
   "Review of Corrosion for the Year 1930"
2. M. J. R. Morris—Republic Steel Company
   "Chromium and Chrome-Nickel Steels"
3. Geo. F. Scherer—Merco Nordstrom Valve Company
   "Corrosion and Lubrication of Valves"

American Society of Mechanical Engineers

1. O. E. Harder—Battelle Memorial Institute
   "Nitriding"
2. P. T. McVetty—Westinghouse Electric & Mfg. Company
   "Creep of Metals at High Temperatures"
3. A. H. d'Arcambal—Pratt & Whitney
   "Machinability of Metals"

Society of Automotive Engineers 1st Session

1. J. M. Watson—Hupp Motor Company
   "Automotive Steels"
2. A. B. Domonoske—Stanford University
   "Testing and Predetermination of the Characteristics of Automobile Engines"
3. B. F. Shepherd—Ingersoll-Rand Company
   "Steel Personality"

Continued on Page Four

PLANS FOR WESTERN SHOW MOVING AHEAD

Thirteen Technical Societies Cooperating with the A.S.S.T.

Continued from Page One

and impellers of duralumin, capable of handling injurious gases and acid fumes, are announced by one manufacturer, while recording gages, thermometers, pyrometers, automatic temperature control safety devices, gas fired furnaces and safety set screws will be featured elsewhere in the show.

Throughout, the Exposition is designed to act as a high educational factor in leading the West, as well as all other spots in this country, to adoption of a still finer grade of metallurgical products and machinery for industrial purposes.

Virtually every variety of stainless steel, chromium products, aluminum alloys and nitrided specimens will be shown, with many of these pieces demonstrated by physical testing machines to show their durability and adaption for severe stresses.

For more than three months, W. H. Eisenman, secretary of the Society, has been in San Francisco, making arrangements for the affair, and this vast amount of work is being taken by many to presage one of the society's most successful shows.

Almost all papers are turned in to the program committee, and these are being reviewed to insure their accuracy in even the most minute statements.

Thirteen different technical societies, as follows, have linked hands to take part in the congress or the exposition:

American Chemical Society, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Society for Steel Treating, American Welding Society, Institute of Metals, National Purchasing Agents Association, Pacific Coast Electrical Association, Pacific Coast Gas Association, Society of Automotive Engineers, American Society for Testing Materials and National Association of Power Engineers.

WESTERN TECHNICAL PROGRAM

Continued from Page Three

Society of Automotive Engineers
2nd Session

1. Wm. M. Holzhauer—Aluminum Company of America
   "Aluminum Alloys"
2. Dr. Gann—Dow Chemical Company
   "Magnesium Alloys"

American Society for Testing Materials

1. L. T. Holt, Consulting Physical Metallurgist, Seattle, Wash.
   "The Failures of Machine Parts"
2. Paul E. Jeffries, Structural Engr., Los Angeles
   "Metallography of Welding"

IN FEBRUARY METAL PROGRESS

Continued from Page One

Metal Progress will take great pleasure in presenting Mr. Knapp's article next month.

Metal Progress will also carry two other articles originating on the west coast, although neither was prepared as a congress paper. Dr. Welton J. Crook of Stanford University has written a brief sketch of the facilities for metallurgical study which Stanford offers young men. Miles C. Smith, Stoody Co., has prepared exclusively for *Metal Progress* a paper on the recent developments in hard facing alloys.

One of the most interesting articles of the whole issue is one which is neither a Western Metal Congress paper nor a paper prepared by a Pacific Coast man. Major R. A. Bull, director, Electric Steel Founders Research Group, Chicago, has prepared for *Metal Progress* an authoritative and comprehensive comparison of casting and welding. Major Bull's recognized knowledge of foundries and metallurgical problems has well fitted him for the preparation of such a paper.

BUFFALO MEN HEAR TALK ON DEEP ETCH

H. G. Keshian Discusses the History and Present Application of Metal Test

By Charles F. Wahl

The fourth regular meeting of the Buffalo chapter was held on Thursday, Dec, 18th, at Hotel Buffalo.

Chairman H. J. Cutler called the meeting to order and after a few brief remarks, introduced the speaker of the evening, H. G. Keshian, metallurgist of the Chase Companies, Inc., and chairman of the New Haven chapter, American Society for Steel Treating, who spoke on the subject, "Deep Etching".

The deep etch test of steel consists of subjecting the metal to the action of various mixtures of acid to reveal its structural features. It was first used by Sorby, of England, in 1887.

The deep etch is a test for soundness of steel, but not for the quality. The strength and the temperature of etching acid, also the time of immersion are very important in influencing the results obtained. Tools and machines have gained such importance, beyond comparison. New methods of heat treatment must be devised to cope with the present needs. Physical properties or chemical composition are what we want to know and the way the chemical elements are arranged in the metal.

Mr. Keshian illustrated his talk with the aid of metal specimens, charts and slides, showing the different failures which occur in steel. Nineteen members were present for dinner and about forty members and guests attended the meeting.

A lively discussion followed.

WASHINGTON-BALTO. HAS MOVIE MEETING

Chapter's Custom of Pictures at Holiday Meeting Continued

By Leo J. Waldron

The December meeting of the Washington-Baltimore chapter was held at Washington, Friday, Dec. 12. The dinner was served at the Madrillon Restaurant, where a good get-together was enjoyed by all.

Later the group, together with friends and guests, met in the auditorium of the Interior Building where two motion picture films were shown. In the past, it has been the custom of the group to have moving pictures shown at the holiday meeting.

The first film, "The Story of Iron", in five reels showed in detail the various methods used in mining, crushing, and sampling of iron ore, transportation to stock piles, charging and tapping of blast furnaces and casting methods used. This film was produced by the U. S. Bureau of Mines in cooperation with Pickands, Mather & Co., the Bethlehem Steel Corp., and Youngstown Sheet and Tube Co.

The second film, "Heat Treatment of Steel", in two reels, was produced by the Bureau of Mines in cooperation with the Hupp Motor Car Co., of Detroit, Michigan. It showed modern heat treatment of automobile parts together with the various inspection tests employed for final acceptance of the parts. It also showed laboratory experiments with steel, heat treating methods, and effect of treatments.

COMING CHAPTER EVENTS

Boston
Feb. 6—Aluminum Alloys ....H. E. Dix, Jr.
Mar. 6—Salt Baths .....Sam Tour
Apr. 3—Aston Process for Making Wrought Iron .....James Aston
May 1—Recent Nitriding Developments .....V. O. Homerberg

Buffalo
Jan. 22—Steel Castings .....R. A. Bull
Feb. 26—Metallography .....V. N. Krivobok
Mar. 26—X-Ray .....R. H. Aborn
Apr. 23—Steel Manufacturing .....G. B. Waterhouse

Canton-Massillon
Feb. 3—Sheet Metal .....G. L. Kelly
Apr. 7—Corrosion .....C. F. Rassweiler
May 5—Castings .....F. B. Coyle
June 2—Furnaces .....H. P. McCann
June—Annual Outing (date not set)

Chicago
Feb 12—Ladies Night .....Paul E. Klopstag
March 12—Industrial Research ..O. E. Harder
April 9—Recent Scientific Developments .....Zay Jeffries
May—Inspection Trip .....

Cincinnati
Feb. 5—Nitriding .....A. B. Kinzel
March 5—Structural Alloy Steels..H. J. French
April 5—Alloy Steels .....J. P. Gill
May 7—.....

Cleveland
Feb. 9—Research .....H. M. Boylston
Mar. 9—Liquid Hardening Baths .....George Barsky and E. C. Moffett
Apr. 13—Metallurgical Features of Front Wheel Drive .....Raymond Rolfe
Taking "Bugs" from Valve Springs .....W. T. Donkin
May 11—Light Alloys for Construction.....
Visitation Trip to Dirigible Hangar, Goodyear Zeppelin Corp., Akron, O.

Detroit
Feb. 9—Surface Hardening .....A. B. Kinzel
March 9—Cast Iron .....R. N. Allen
April 13—Tool Steels .....J. P. Gill
May 16—Ann Arbor Meeting .....

Hartford
Feb. 10—The Abrasive Industry .....Allen Seymour
March 10—Welding .....Mr. S. Martin, Jr.
April 14—Metallurgists in Industry .....Zay Jeffries
May 12—Forgings .....J. R. Adams

New Haven
Feb. 19—New Ferrous Alloys .....Chas. Davis
Mar. 19—Ingot Design .....G. A. Dornin
April 14—Recent Nitriding Developments .....V. O. Homerberg
May 21—Tool Steel Progress .....Dr. J. A. Mathews
June 19—Annual Dinner .....

New York
Feb. Meeting—Probably plant visitation to the International Nickel Company's new Research Laboratory .....
March Meeting—Open .....
April Meeting—Annual Smoker .....

Ontario
Feb. 6— .....J. P. Gill
March 6—Steel Failures ....H. B. Knowlton
April 10—Malleable Iron ..Dr. H. A. Schwartz
May 8— .....T. Holland Nelson

Pittsburgh
Feb.— .....N. I. Stotz
March—Casting Guns by Centrifugal Process .....T. C. Dickson
April—Chrome Nickel Steels ...V. N. Krivobok
May—Nitriding .....W. J. Merten

Rhode Island
Jan. 21—Electric Heat .....R. M. Cherry

Rochester
Feb. 9—Heat and Corrosion Resisting Steels.....T. H. Nelson
Mar. 9—Armco Iron and Vitreous Enamelling .....D. M. Strickland

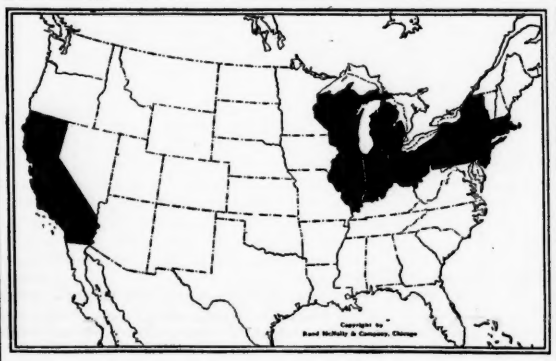
Rockford
Feb.—Tool Steel .....W. H. Willis
March—Research and Industry ..O. E. Harder
April—Forgings .....A. M. Steever
May—Tungsten-Carbide Tools .....

Springfield
Feb.— .....Dr. R. S. Williams
March 23—Corrosion Resisting Steels .....Frank R. Palmer
April 20—Alloy and High Test Cast Irons .....Frank Coyle
May—Educational meeting .....

Syracuse
Feb. 10—Stainless Steel .....Jerome Strauss
March 10— .....
April 14— .....

Tri-City
Feb.—X-Ray Analysis .....C. W. Page
March—Pyrometers and Controls ..Mr. Taylor
April and May—Tentative .....

York
February 11—Elec. Furnace Heat Treatment .....Jordan Korp
March 11—Large Forgings .....J. R. Adams
April 17—Aircraft Metallurgy ..H. C. Knerr



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Address answers care of AMERICAN SOCIETY FOR STEEL TREATING, 7016 Euclid Ave., Cleveland, unless otherwise stated.

POSITIONS OPEN

CHEMIST (analytical): Eleven year's experience in the analysis of ferrous, nonferrous and special alloys of all kinds, coal, coke, oils, etc. Accurate, energetic, and can establish small laboratory. Age 31. Address 12-25.

METALLURGIST in charge of special alloy steel development and production will be available shortly. Has had supervision of high frequency induction furnaces as well as arc type. Address 1-25.

SIXTEEN YEARS EXPERIENCE in heat treating alloy steels and hardening all kinds of steel, was connected with heat treatment department of large automobile manufacturing concern. Foreman for ten years. Address 1-35.

METALLURGICAL ENGINEER and foundryman desires connection. Graduate M.I.T. and Harvard. Thirteen years experience in gray iron, brass and steel foundry research and management and in metallurgy and heat treatment of carbon and alloy steels. Address 1-30.

POSITIONS WANTED

SALES MANAGER wanted in the middle west; long years' experience in the tool steel trade and good connections among middle west users and distributors essential; Chicago resident preferred; write fully, also giving references. Address 12-5.

O. K. PARMITER DEC. HARTFORD SPEAKER

Over 100 Hear Data on Cobalt Super High Speed Steel

"New Super High Speed Steels" was the subject discussed by Owen K. Parmiter, metallurgical engineer, Firth Sterling Steel Co., before the Hartford chapter of the American Society for Steel Treating on Dec. 9th.

Anticipating a splendid treatment of the subject 58 members and 46 visitors representing most of the important manufacturing companies of the district attended.

Mr. Parmiter gave a brief but complete description of the manufacture, treatment, and forming of the improved cobalt high speed steel.

To obtain the greater red hardness of cobalt high speed steel, to which its superiority is due, it is necessary to use higher hardening temperatures than those required by ordinary high speed steel. The greater red hardness is attributed to the fact that cobalt is not a carbide-forming element, and hence concentrates the carbides in a matrix of cobalt-iron.

Annealing is best done in mica or lime dust. If annealed in the forge the steel should be covered with hot coals and allowed to cool.

When the tool will permit deep grinding after hardening, the heating should be done slowly to not over 1500° F.; then it should quickly be raised to between 2425 and 2500°. Large tools require two preheat treatments.

If quenched in oil the tool should be quenched until black and then drawn back immediately. If quenched in molten salt the bath should be at 1050° F. and the tool should be left in the bath thirty minutes. The draw back after salt bath quenching requires one hour at temperature. For shock resistance the best draw back range is 650 to 700° F. For greatest red hardness 1050° F. is best.

To protect the surface of the high speed tools in hardening, four methods are available. The Hayes furnace which provides a gas curtain in front of the door is good. When equipped with globar heating elements it can be used continuously at 2500 and intermittently at 2700° F. This furnace has separate chambers for mixing the gas and air. Protective coatings applied to the tools, such as borax or adamant cement, are also quite practical for ordinary shop tools. Separate containers, made of nickel or nichrome, or of silicon carbide, are satisfactory for small parts. The diamond block of silicon carbide is limited to temperatures of 2300° F. and under, because higher temperatures cause the tools to take up carbon which lowers their melting point. The fourth method, the use of a fused salt bath for heating is very good for hardening fine edge tools. This method is limited to temperatures up to 2275° F.

Tools made of super high speed steel should be as large as those made of regular high speed. Light feeds are preferable, and for best results the machine must be rigid.

The hardening temperature should be reached as quickly as possible from the preheat temperature, and no time should be allowed for saturation. A rising heat is preferable and will give uniform results if the proper routine is established. Quenching from a rising heat allows the use of higher temperature with less decarburization. A draw back of 800° F. will give greater toughness than one of 1100° F.

Molybdenum is used in super high speed because the carbides of molybdenum are intensely hard. The best hardness range for tools of super high speed is Rockwell C 63 to 67.

When using super high speed, it is usually advisable not to reduce the number of teeth in a milling cutter, because of the increased impact on the teeth if they are too widely spaced.

The Chairman, Henry Fishbeck, called a halt to the discussion at this point to enable the speaker to get some rest and an enthusiastic vote of thanks was given the speaker and also to the technical chairman, D. A. Nemser, for his excellent work in conducting the discussion.

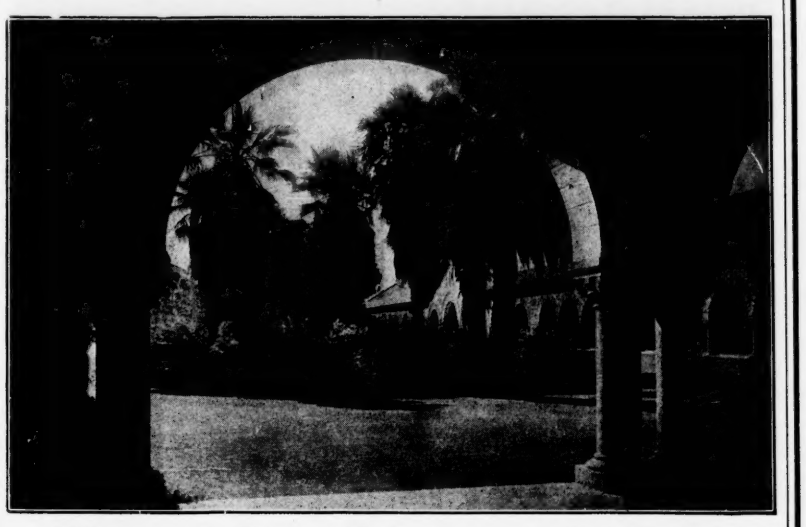
"IRON ORES" AT NOTRE DAME

November Meeting Headlines Talk on Ore Formation by Prof. Smith

By Charles D. Carr

The Notre Dame group's second regular meeting of the scholastic year was held Nov. 17th. Prof. Knowles B. Smith of the Mining Engineering Department spoke on the subject of "Iron Ores". In his discussion Professor Smith differentiated between a mineral and an ore. He stressed in particular the kinds and formation of iron ores, their geographical location, and the elements or substances generally associated with these ores in their native state.

Seen Near San Francisco



Visitors to the Western Metal Congress in San Fancisco next month will be charmed by hundreds of scenes as delightful as this.

MILL ROLLS LARGEST PLATE

Lukens Steel Co. Rolls Plate Weighing 48,200 Pounds from 46-ton Ingot

On its 206-inch four-high reversing type, plate mill, the largest plate-rolling mill in the world, the Lukens Steel Co., Coatesville, Pa., produced on Dec. 26 the largest and heaviest steel plate ever rolled up to the present time.

The plate was reduced from a carbon steel ingot weighing approximately 92,130 pounds, produced in their open hearth. The sheared dimensions of the large plate are 195 inches in width, 360¾ inches in length and 2⅜ inches in thickness. It weighs approximately 48,200 pounds.

Rolling mill operations were in charge of R. W. Simpson, superintendent of mills, supervised by J. H. McElhinney and W. H. Warren, respectively general superintendent, and vice-president and general manager, of the Lukens Steel Co.

TRI CITY HEARS HOW TO TREAT HI-SPEED

F. R. Palmer Tells Intricacies of Treatment to 65 Members

F. H. Palmer, assistant to the president of the Carpenter Steel Co., discussed three unique phases of the heat treatment of high speed steel at the December meeting of the Tri-City chapter of the American Society for Steel Treating, held Dec. 2nd at the Le Claire Hotel.

Brittleness produced by fish scale fractures was the first phase discussed by Mr. Palmer. Failures of high speed tools due to brittleness was found to occur when the metal showed a fish scale fracture. This fracture after much exhaustive experimental work was found to occur when high speed steel was heat treated a second time. At first the correct hardness was not obtained, and the heat treater attempted to obtain correct hardness by a second treatment at a higher temperature than the first, which produced this fish scale fracture, which fracture cannot be seen under the microscope. It was found that this condition could be eliminated only after an excessive amount of work had been done on the tool, that is by reducing its cross section to about 50 per cent of the original cross section of the tool.

What happens when high speed steel is quenched was the second subject discussed by Mr. Palmer. A very outstanding problem was encountered when high speed steel was quenched. If the steel was taken from the quench too soon, before the hardening process had started properly, and was put in the furnace for the drawing operation, the material would be too soft as hardening had not started.

Pack hardened high speed steel was next discussed. One of the most important things to be remembered when pack hardening high speed steel is that complete detailed record should be kept of every step and item used in the pack hardening operation if the results are to be duplicated later on. The smallest variation in procedure will result in hardened tools that will not give the same performance record service as a lot which has a slightly different pack hardening treatment.

Another interesting detail pointed out by Mr. Palmer was that if the carbon content becomes too high, such as 2.00 per cent, the temperature obtained in the hardening process may be sufficient to melt the high carbon outside part of the tool under treatment.

The meeting was well attended by about 65 members.

CHICAGO HAS GREAT MEETING WITH S.A.E.

Jerome Strauss Talks Chiefly On Properties of 18-8 Alloy

By Harry Hardwicke

One of the largest and most successful joint meetings ever sponsored by the Chicago chapter was held Thursday, Dec. 11th, in cooperation with the Chicago section, S. A. E.

The coffee talk was delivered by Col. Calvin Goddard, director of the Scientific Crime Detection Laboratory, Northwestern University. Introduced by Chairman Don Colwell as the modern Sherlock Holmes, Col. Goddard more than once thrilled his audience with tales of modern crime detection based on scientific methods and apparatus.

The guest of honor and principal speaker was Jerome Strauss, chief research engineer, Vanadium Corporation of America. He spoke on the technical properties of corrosion and heat resisting alloys of the of the chrome-nickel-iron system with special reference to the alloy known as 18-8.

His talk, illustrated with many slides, was highly practical, and considered one at a time the many commercial alloys of this system. Discussion was spontaneous and interesting.

E. W. Stewart, chairman of the Chicago section, S. A. E., served as the technical chairman of the joint meeting. An added feature designed to interest the tired engineers was a special entertainment arranged by the S. A. E.

ROCHESTER HEARS INTERESTING TALK

W. H. Phillips, Main Speaker Talks About Molybdenum

By Walter F. Morton

The December meeting of the Rochester chapter of the A. S. S. T. was as varied as it was interesting. The affair, as usual, was held in the Powers Hotel and was very well attended.

After an excellent dinner the boys puffed contentedly on cigars set up by one of the cherished brother members and listened to a very interesting coffee talk by the secretary of the Rochester Chamber of Commerce, Roland B. Woodward. Mr. Woodward offered the hospitality and facilities of the Chamber for the forthcoming regional meeting of the A. S. S. T. in Rochester and recalled the successful regional meeting held a few years ago.

Mr. Woodward then discoursed informally on men and the times. He called attention in particular to two errors which highly trained technical experts are prone to make, namely overemphasis of their own particular field and underemphasis of the human element.

The speaker of the evening was Mr. William H. Phillips, vice-president of the Molybdenum Corp. of America, who lectured on the subject of "Molybdenum". After reviewing the history of the discovery and development of this element, the speaker enumerated the particular sources of supply and methods of extraction. By means of a comprehensive series of slides Mr. Phillips demonstrated some of the remarkable properties of the alloys of this metal.

Corrections for National Metal Handbook

You should note carefully the following corrections for Metals Handbook and make proper notations on the pages indicated:

PAGE 37—In the first column on page 37, item thirty-seven is: 21. **Duraloy.** This should read: 21. **Dualoy.**

PAGE 150—The first column of Table 1 on page 150 is headed "Diameter of Chain Stock, Inches". In this column the next to the last figure is 1⅛. This should read 1⅞.

PAGES 228, 229, and 230—In the tables given on these pages, the chemical compositions are given for the S.A.E. nickel, nickel-chromium, molybdenum, chromium, chromium-vanadium, tungsten, and silico-manganese steels. These tables should carry the following footnote:—

Silicon range of all S.A.E. basic open-hearth alloy steels shall be 0.15 to 0.30 per cent. For electric and acid open-hearth steels the silicon content shall be a minimum of 0.15 per cent.

PAGE 279—In Fig. 7 on page 279 the curve marked **Elon. in 2"** should be marked **Izod.** The curve marked **Izod** should then be marked **Elon. in 2".**

PAGE 409—Etching solution 4a on page 409 under the headings **"Remarks"** and **"Used to Show"** should read as follows:

Remarks	Used to Show
Warm the specimen in hot water before etching. For best results use method of alternate polishing and etching. Proposed by Vilella.	Structure of medium and high carbon iron-chromium base alloys and high speed steel. May be used for etching iron-chromium base alloys containing Al, W, Mn, V and Mo.

PAGE 411—In the etching solution No. 6 on page 411 under the heading REMARKS, change the words **Distilled Water** to **Alcohol.**

PAGE 619—On page 619, line 28, change the 1.4 to 2.4.

This list can be pasted on the flyleaf of the Handbooks

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SALT BATH TALK IS PRAISED BY DAYTON

Dr. Sam Tour Covers Uses and Composition of Various Types

By G. R. Long

About twenty-five members of the Dayton chapter gathered for the December dinner meeting at the Engineers' Club. Lt. Edward H. Metzger, F. A., U. S. A., stationed at Wright Field, told about the seventy-five mile Paris gun. After hearing some of the details concerning this monster gun, there were quite a few speculations concerning what materials were used to withstand the tremendous stresses to which these metals must have been subjected.

The main talk of the evening was given by Dr. Sam Tour, who discussed salt baths. Not very long ago salt baths were considered a new development, but actually barium chloride was first used in Germany in 1896. The troubles which were apparent in this medium were gradually overcome, and today the salt bath is a valuable tool of every heat treater.

The purpose for which a bath is used should determine its composition, for no single salt can cover the temperature range from 400 to 2000° F.

It is foolish, Mr. Tour said, to heat salt baths from the bottom. Heat is being taken out at the top, and it is logical that heat should be applied close to that point. A salt bath furnace should be specially designed for that purpose, since not every kind of furnace will do. The important points are: to apply heat near the top, to prevent impingement of flame directly on the pot, to provide well designed drains in case the pot breaks, and to allow sufficient room for proper combustion.

Hardening baths usually consist of chlorides in their eutectic proportions. Some combinations are more foolproof than others due to the slope of their melting point curves. A steep curve means a large change in melting point with a small change in composition. Cyanides are often used with hardening baths to prevent decarburization. The percentage of cyanide in a bath to make it neutral depends on the temperature of operation and the amount of carbon in the steel. A low carbon steel is always carburized by even a slight amount of cyanide while higher carbon steels will stand more cyanide. Decarburization is caused by carbonates. Carbonates may be removed by addition of boric acid, and cyanides will counteract their action.

Newer developments in heating of steel were discussed, including high frequency induction furnaces, electric heating by making the pot one electrode and having another electrode in the middle of the bath, and the new Globar furnace with the Hayes gas screen.

COVERS RESEARCH BY GAS INDUSTRY

Milener Tells Rhode Island Men of Metal Investigation

At the Dec. 17 meeting of the Rhode Island chapter of the American Society for Steel Treating, Eugene D. Milener, industrial representative of the American Gas Association, gave a talk on the "Gas Industry's Research Program in Metallurgy."

One of the most promising developments of this research program is in the field of forging. Mr. Milener described the new luminous gas-fired forging furnace which duplicates the radiant heat effect of oil or coke, while the work is protected by a blanket of gas.

In the field of bright annealing, the speaker gave a brief resumé of the effects of different non-oxidizing atmospheres upon different metals and the work that has been done is the direct result of this work. In this furnace methanol is used as an atmosphere with very satisfactory results, even in the bright appealing of brass.

Among other lines of investigation conducted by the research committees, Mr. Milener mentioned the following problems as showing promise of being brought to a successful conclusion: the decarburization of steel, brass melting, short time malleableizing, scaling of steel at heat treating, temperatures, submerged combustion, elimination of noise in gas combustion and control of combustion using preheated air.

Following this talk, a number of slides were shown of modern gas furnace installations in nationally known concerns.

This meeting was held at the Providence Engineering Society's rooms and was conducted under the auspices of the industrial division of the Providence Gas oCmpany.

SOUTHERN TIER HEARS TALK ABOUT NICKEL IN CAST IRON

C. D. Grover Is December Speaker

By W. S. Bennett

The last regular meeting of the Southern Tier chapter was held at Jenkins Inn, Waverly, N. Y., Dec. 15th. H. S. Snodgrass, chairman, presided at the gathering and thirty-five members and guests were in attendance.

Mr. C. D. Grover, of the Whitehead Metal Products Co., which is allied with the International Nickel Co., was the principal speaker. He talked on "The Mechanics of Nickel in Cast Iron".

He pointed out that in general the properties which nickel imparted to cast iron were largely the properties of pure nickel. And that pure nickel, contrary to the usual belief, possessed very high values in many of the tests of physical properties.

The meeting was terminated with a lively discussion concerning the use of nickel as opposed to other methods of controlling the characteristics of cast iron.

COLUMBUS MEN LIKE CLEAR X-RAY TALK

Dr. St. John Explains Complex Subject in Simple Terms

By L. H. Marshall

The regular monthly meeting of the Columbus chapter was held Tuesday, Dec. 9, at the Fort Hayes Hotel. Sixteen were present at the dinner preceding the meeting. A coffee talk on "Technical Control" was given by Mr. R. E. Christin, former chairman of the Columbus chapter. Mr. Christin's talk was most interesting as he forcefully brought out the benefits and limitations of technical control as applied to shop practice.

The guest speaker of the evening was Dr. Ancel St. John of the St. John X-Ray Service Corp. who spoke on "Internal Defects in Metals", particularly as brought out by X-ray examination. This talk was most interesting and instructive. In spite of the technical nature of X-ray work, Dr. St. John handled his subject so clearly and well that a course in physics was not required to follow him. It was very illuminating to learn of the strides X-ray work has made in becoming a practical method of examining vital members commercially.

Steel castings and welds up to 2½ inches wall thickness were shown to be readily handled. Even with such heavy sections minute flaws were definitely exposed when present. It was pointed out that breaking castings often does not expose the major defects present, but by the use of X-rays a complete story can be had.

A great advance in the examination of welds was also shown. In the case of large pressure tanks, it has been found that the welds can be quickly and rather inexpensively examined by X-ray. Figures were quoted to show that the welds could be made and X-rayed at less cost than would be required for a riveted joint on the same tank. X-ray photographs of various welds were presented and showed marked differences between good and poor welds.

This talk held the close attention of the forty members and guests present.

AIRCRAFT METAL TALK LURES RECORD CROWD AT WORCESTER

H. J. Fischbeck Pleases Audience

By R. C. Jordan

The November meeting was held at the Rebboli Restaurant, with H. J. Fischbeck, chief metallurgist of the Pratt & Whitney Aircraft Co., as speaker.

Mr. Fischbeck spoke on "Metallurgy in Aircraft Construction", and brought several parts, as well as lantern slides, to illustrate his points. Sketching the history of the airplane motor, it was shown that the radial air-cooled engine was delayed in its development by the lack of proper materials for its construction.

The comparatively recent development of aluminum and its alloys has made it possible to manufacture the Pratt & Whitney motor with over 40 per cent of its weight in alumium. Several standards for aircraft steels were developed in 1918, practically all of which have since been revised or discarded.

Mr. Fischbeck indicated that during the next few years the development of aircraft steels will turn toward more efficient handling and heat treatment of the alloys now in use.

This meeting drew the best attendance of the year.

FRENCH ADDRESSES LEHIGH V. CHAPTER

Effect of Alloy on Structural Steel Subject of Good Talk

H. J. French, metallurgist of the development and research department, International Nickel Co., in a talk before the Lehigh Valley chapter, on Friday, Dec. 5, gave a very interesting account of the influence of various alloying elements on the properties of alloy structural steel.

In spite of the wide field included by this subject, Mr. French summarized its ramifications clearly and concisely. A lively discussion followed the talk since a large group was vitally interested in its content. A brief resume of his remarks follows.

During recent years the types of structural alloy steels have increased in number and there has been a broadening of their fields of application. Consequently many of the commercial low-alloy steels containing one or more of the elements nickel, chromium, molybdenum, vanadium and manganese can be used somewhat interchangably.

In commercial structural steels, nickel is either used alone or with other elements. Up to 5% nickel, the critical is somewhat lowered. Nickel is present in steel in solid solution in the ferrite. It increases the hardness without the usual decrease in toughness. In boiler plates this amount of nickel has desirable effects in resisting the aging and the cracking that takes place.

Chromium is used alone or with other elements. Up to 2% chromium, the critical range is raised on heating and lowered on cooling. Chromium occurs in steel in the ferrite and as a carbide with iron. Chromium steels have high hardness and great resistance to permanent deformation.

Molybdenum is generally used in combination with other elements such as chromium or nickel, or both. It is unique in its ability to confer air hardening properties on steels when added in small amounts. It causes a splitting of the critical.

Vanadium is usually used in combination with other elements. It occurs partly in the ferrite and partly in the carbide and is very effective in keeping the grain size small. This latter characteristic makes vanadium useful in the production of large forgings where quenching would introduce serious difficulties.

Manganese may be used alone, but is generally used in combination with varying percentages of nickel, chromium, molybdenum or silicon. Manganese occurs in solid solution in the iron and as manganese carbide. It lowers the transformation temperatures and increases the strength of steel appreciably.

Many of the nickel-chrome, nickel, chrome-vanadium or chrome-molybdenum steels have similar physical properties if the heat treatments are regulated for the results desired. This interchangability is somewhat limited when these steels are used in large sections.

While the mechanical properties of many low-alloy structural steels are similar, certain characteristics of their manufacture, shaping or machining, may make it advantageous to select a particular steel from a group that represent widely different analyses, but are alike mechanically. Chemical composition does not tell the whole story. Of perhaps greater importance is the "quality" factor which has a great influence on the suitability of steels for a given purpose.

INDIANAPOLIS ARC WELDING LECTURE STIRS ENTHUSIASM

R. Notvest Featured Speaker

By Wm. H. Knowles, Jr.

"The Fundamentals and Economics of Arc Welding" was the title of an illustrated lecture given by Mr. R. Notvest of the Northwestern Manufacturing Co. at the December meeting of the Indianapolis chapter.

Samples of the welds made on chromium steels for large milk containers were shown. These welds must be absolutely free from flaws, as the slightest unevenness on the interior surface will hasten bacteria growth.

Brass and aluminum alloys are successfully welded, but discussion brought out the difficulties involved in arc welding cast iron. One firm here had attempted to salvage defective castings by arc welding, only to meet trouble later in machining them.

That the use of arc welding will in many cases simplify design, increase the quality of a product, and reduce assembly cost, is well known and the alertness of industry to new developments is shown by the fact that one company alone was represented by over forty people at this meeting.

INDIANAPOLIS CHAPTER HEARS GOOD TALK ON REFRACTORIES

G. S. Kennelley is Speaker

By William H. Knowles, Jr.

The Indianapolis chapter was fortunate in having G. S. Kennelley, of the General Refractories Co., as speaker on "The Classification and General Use of Refractories", at its January meeting.

One of the problems every one in this part of the country seems to be faced with is to find a refractory suitable for Indiana coal, and the speaker had some suggestions to offer along this line. Large blast furnace installations using new process refractories were discussed, among them a blast furnace recently completed with 1200 ton capacity a day. A lining which would stand up under the severe use in cyanide tanks was another subject

A discussion of topics other than that of dealing with heat treating was well received by the members after several meetings on metallurgical subjects alone.

CREDITS ELECTRIC HIGH SPEED STEELS

Last 30 Years an Alloy Age, Dr. Mathews Tells Syracuse

By Walter J. Hansen

Introduction of high speed steel with the results attained and the commercial application of electric furnace steel making were given as reasons for designating the last 30 years as the "alloy steel age", by Dr. John A. Mathews, vice-president and director of research of the Crucible Steel Co. of America, at a meeting of Syracuse chapter, American Society for Steel Treating, in the Onondago Hotel, on Dec. 3. Dr. Mathews spoke on "Tool Steel Progress in the 20th Century."

No branch of science or industry, Dr. Mathews declared, can exist independent of all other branches.

High speed steel, as we know it, did not exist at the beginning of the 20th century. There were no electric furnaces in this country. Vanadium was a chemical curiosity and the microscope, as a research aid, was but little used. Pyrometers were scarcely used in the industry, and were not too common in laboratories.

Dr. Mathews spoke of the most recent developments in permanent magnet steel, especially the investigations of Honda in Japan and Brace in the United States, and described a few of the many types of alloy steels. He also stressed the progress from the study of materials and physical properties, methods, of heat treatment and the study of their proper fields of usefulness.

"The iron and steel industry has not yet delved into fundamental metallurgy," Dr. Mathews said.

Emphasis was placed upon the spirit of inquiry that has come out of the developments of the past 30 years. Research i s receiving recognition in all branches of industry, the microscope is now generally adopted; X-rays have not advanced quite so far in the industry, but are on their way. Magnetic and electric testing; volume changes in handling and tempering steel and many other refinements are in daily use.

PHILADELPHIA MEN SMOKE

Much Hilarity at Annual Smoker of Chapter, Held December Fourth

By T. E. Eagan

The annual smoker of the Philadelphia chapter was held at Mercantile Hall on Thursday, Dec. 4. Four hundred members and guests attended the festivities. All had a good time.

An excellent dinner, served by one of our local caterers, started the fun. After singing themselves hoarse, the members convened in another room of the building and were entertained by a bevy of very talented actors and actresses.

Mr. Norman Ernwechter, the chairman of the Entertainment Committee and his coworkers on that committee, Messrs. R. H. Patch, H. B. Gaylord, and A. O. Schaefer, are to be congratulated for their efforts in arranging the smoker this year.

C. F. PASCOE, MONTREAL, PROMOTED

The appointment was announced recently of C. F. Pascoe, formerly technical engineer of the Canadian Steel Foundries, Ltd., as superintendent of the company. Mr. Pascoe's work a few years ago in the development of nickel steel locomotive side frames is well-known in the metallurgical world. In 1927 he served as chairman of the Montreal chapter, A. S. S. T.

MONTREAL MEN HEAR LOCAL MEMBER TALK

F. C. Farey Talks to Chapter About Inspection, Testing

By D. MacInnes

For the first time since the organization of the Montreal chapter, American Society for Steel Treating, a paper was read by a local member. F. C. Farey, general manager of the Robert W. Hunt Co., and member of the executive of the Montreal chapter spoke at the Dec. 15th meeting on the subject of "Inspection and Testing".

Mr. Farey gave a general review of the subject of inspection and testing, featuring the inspection of rails and explaining the operation of the Sperry rail fissure detector.

Mr. Farey pointed out that inspection and testing consisted of a great deal more than the usual routine tests. He stated that practically no manufactured articles are perfect, and that the inspector should be sufficiently acquainted with the articles he inspects to know what they are being used for, and know considerably, also how they are made.

The speaker then outlined the duties of inspectors in examining castings, structural sections, and welding. He pointed out that welding inspection calls for men who are specially trained for welding work, and have an extraordinary supply of good judgment.

Discussing steel rails, Mr. Farey pointed out that no other metal product had been subject to more careful inspection, outlining the changes that had occurred in the past twenty years in the method of inspection and testing of this product. Early inspection of rails called for ordinary inspection of the finished product, consisting largely of an examination for straightness, flaws, finish, etc., and in the observation of the usual drop test.

In 1912. observations indicated that the life of the rail and its effectiveness was contingent upon the mill practice, the method of manufacture of the steel and the various stages in rail production. What is known as special inspection was then introduced. He detailed the rigid inspection that is given now in the production of rails, following the steel from the open hearth or Bessemer through to the finished product.

Mr. Farey then described the Sperry machine which is used for determining the condition of the rail in the track. By means of electrical instruments the machine, which moves along the rails at a rate of five or six miles an hour, will indicate transverse fissures and other defects in the rails.

As these defects would probably result, in time, in track failure, their detection by the machine is undoubtedly resulting in a great saving in property and possibly life.

SHEPHERD RECALLS EUROPE TO LEHIGH

A. S. S. T. Director Tells About European Metal Practices

By H. F. Paulus

Business cares and technical problems were forgotten when one hundred members of the Lehigh Valley chapter met for their annual dinner meeting in Allentown, Pa., on Nov. 7th. Chicken and waffles, which formed the mainstay of the menu, disappeared rapidly

The speaker of the evening was B. F. Shepherd, charter member of the Lehigh Valley chapter, metallurgist of the Ingersoll-Rand Co., and director-elect of the National Society. His talk, "Impressions of Europe", was a vivid portrayal of his recent personal experiences in Germany, Sweden, Belgium, Czecho-Slovakia, Austria, France and England.

Through the medium of a very excellent set of motion pictures made by himself, Mr. Shepherd was able to take the chapter on a personally conducted tour of this very interesting portion of Europe, now poking an inquisitive nose within some Swedish steel mill, now flying into the heart of Germany on a thrilling airplane hop, now sweeping down some Parisian Boulevard in a taxicab! The thrills lasted to the very end, when the "chapter's" ship, the Olympic, won a close race into New York Harbor.

Among many trophies of metallurgical interest, Mr. Shepherd displayed a penknife, the blade of which was of "18-8" stainless steel, hardened by cold work to a Vicker's brinell hardness of 700. Mr. Shepherd's observations upon both metallurgical practice and general conditions in Europe were extremely interesting, and his "Impressions of Europe" will undoubtedly be lasting ones for Lehigh Valley.

Sustaining Members of the American Society for Steel Treating

NATIONAL

Allen & Co., Ltd., Edgar ..... England
General Alloys Co. ..... Boston
La Consolidada, S. A. ..... Mexico City, Mexico
Pelican Well Tool & Supply Co. .... Shreveport, La.
Universal Steel Co. ..... New York City
Vato, All Union Automobile & Tractor Corp. ..... Moscow, U. S. S. R.
Vulcan Crucible Steel Co. ..... Aliquippa, Pa.

BOSTON CHAPTER

Achorn Steel Co. ..... Boston
Amer. Bosch Magneto Corp. ..... Springfield
American Elec. Furnace Co. ..... Boston
American Steel & Wire Co. ..... Boston
Bethlehem Shipbuilding Corp. ..... Quincy
Bethlehem Steel Co. Inc. ..... Boston
Boston Consolidated Gas Co. ..... Boston
Boston Gear Works, Inc. ..... No. Quincy
Brown-Wales Co. ..... Boston
Byers Co., A. M. ..... Boston
Crucible Steel Co. of Amer. ..... Boston
Edison Elec. Illuminating Co. ..... Boston
Evans Steel Co., H. D. ..... Boston
Fellows Gear Shaper Co. ..... Springfield, Vt.
General Alloys Co. ..... Boston
Hartel Brothers & Co. ..... Boston
Hawkridge Brothers Co. ..... Boston
Houghton & Richards, Inc. ..... Boston
Hunt Spiller Mfg. Corp. ..... Boston
Hunt Steel Co., A. E. ..... Boston
Industrial Steels, Inc. ..... Cambridge
Kenworthy, C. F., Inc. ..... Waterbury, Conn.
Ludlum Steel Co. ..... Boston
Mass. Inst. of Technology ..... Cambridge
McDonald & Co., P. F. ..... Boston
National Acme Co. ..... Windsor, Vt.
N. E. Annealing & Tool Co. ..... Boston
N. E. Metallurgical Corp. ..... Boston
Ryerson & Son, Inc., Jos. T. ..... Cambridge
Scott & Williams, Inc. ..... Laconia, N. H.
Surface Combustion Co. ..... Boston
Trimont Mfg. Co. ..... Boston
Union Drawn Steel Co. ..... Winchester
United Shoe Mach. Corp. ..... Beverly
Walworth Company ..... South Boston
Ward's Sons, Edgar T. ..... Boston
Wetherell Brothers Co. ..... Cambridge
Wheelock, Lovejoy & Co., Inc. ..... Cambridge
Wilson-Cutler Company ..... Malden
Wyckoff Drawn Steel Co. ..... Boston
Zurbach Steel Co., L. E. ..... Cambridge

BUFFALO CHAPTER

Bethlehem Steel Co. ..... Buffalo
Buffalo Bolt Co. ..... No. Tonawanda
Carborundum Co. ..... Niagara Falls
Falls Elec. Furnace Corp. ..... Buffalo
Houghton & Co., E. F. ..... Buffalo
Jewell Steel & Mall. Co. ..... Buffalo
Kawin Co., Inc., Chas. C. ..... Buffalo
Miner, Inc., W. H. ..... Kenmore
Pierce Arrow Motor Car Co. ..... Buffalo
Pratt & Letchworth Co. ..... Buffalo
Republic Steel Corp. ..... Buffalo
Simonds Saw & Steel Co. ..... Lockport
Wickwire, Spencer Steel Co. ..... Buffalo
Worthington Pump and Machinery Corp. .. Buffalo

CANTON-MASSILLON CHAPTER

Hoover Co., The ..... N. Canton
Republic Steel Corp. ..... Massillon
Timken Steel & Tube Co. ..... Canton

CHICAGO CHAPTER

Accurate Steel Treating Co. ..... Chicago
Aetna Ball Bearing Mfg. Co. ..... Chicago
Allen Steel Co., Inc., Edgar ..... Chicago
Anderson-Shumaker Co. ..... Chicago
Atlas Forging Co. ..... Cicero
Bell & Gossett Co. ..... Chicago
Bliss & Laughlin Steel Co. ..... Chicago
Chicago Screw Co., The ..... Chicago
Columbia Tool Steel Co. ..... Chicago
Columbia Tool Steel Co. ..... Chicago Hts.
Danly Mach. Specialties, Inc. ..... Chicago
Finkl & Sons Co., A. ..... Chicago
General Electric X-Ray ..... Chicago
Gordon Co., C. S. ..... Chicago
Goss Printing Press Co. ..... Chicago
Halcomb Steel Co. ..... Chicago
Hubbard Steel Fdry. Co. ..... E. Chicago
International Harvester Co. ..... Chicago
Kloster Steel Corp. ..... Chicago
Larson & Sons, Chas. E. ..... Chicago
Lindberg Steel Treating Co. ..... Chicago
Ludlum Steel Co. ..... Chicago
Metal Lubricants Co. ..... Chicago
Peoples Gas Light & Coke Co. ..... Chicago
Poldi Steel Corp. of America ..... Chicago
Pub. Serv. Co. of No. Ill. ..... Chicago
Pub. Serv. Co. of No. Ill. ..... Chicago
Republic Flow Meters Co. ..... Chicago
Republic Steel Corp. ..... Chicago
Strom Steel Ball Co. ..... Cicero
Surface Combustion Co. ..... Chicago
Vanadium-Alloys Steel Co. ..... Chicago
Western Clock Co. ..... La Salle
Wyman-Gordon Co. ..... Harvey

CINCINNATI CHAPTER

Ahrens-Fox Fire Engine Co. ..... Cincinnati
Allis-Chalmers Mfg. Co. ..... Cincinnati
American Rolling Mill Co. ..... Middletown
Andrews Steel Co. ..... Newport, Ky.
Cincinnati Bickford Tool Co. ..... Cincinnati
Cincinnati Grinders, Inc. ..... Cincinnati
Cincinnati Milling Machine Co. ..... Cincinnati
Columbia Tool Steel Co. ..... Cincinnati
Diehl Steel Co. ..... Cincinnati
Dreses Machine Tool Co. ..... Cincinnati
Houghton & Co., E. F. ..... Cincinnati
Kiechler Mfg. Co. The ..... Cincinnati
Lodge & Shipley Mach. Tool Co. ..... Cincinnati
Lunkenheimer Co., The ..... Cincinnati
Mitchell Steel Co., The ..... Cincinnati
Modern Tool Co. ..... Cincinnati
Proctor & Gamble Co. ..... Ivorydale
Queen City Steel Treating Co. ..... Cincinnati
Tool Steel Gear & Pinion Co. ..... Cincinnati
Union Gas & Electric Co. ..... Cincinnati
U. S. Playing Card Co. ..... Cincinnati

CLEVELAND CHAPTER

Alloy Cast Steel Co. ..... Marion
Bidle Co., W. S. ..... Cleveland
Case School of Applied Science ..... Cleveland
Cleve. Punch & Shear Works Co. ..... Cleveland
Cleveland Wire Spring Co. ..... Cleveland
Columbia Tool Steel Co. ..... Cleveland
Darwin & Milner, Inc. ..... Cleveland
General Alloys Co. ..... Boston
Ludlum Steel Co. ..... Cleveland
Marquette Metal Prod. Co. ..... Cleveland
Pitts. Plate Glass Co. ..... Barberton
Ridge Tool Co. ..... Elyria
Super Steels, Inc. ..... Cleveland
United Screw & Bolt Corp. ..... Cleveland
Warner & Swasey Co. ..... Cleveland
Wheelock, Lovejoy & Co. ..... Cleveland

COLUMBUS CHAPTER

Bonney-Floyd Co. ..... Columbus
Buckeye Steel Castings Co. ..... Columbus
Columbus Bolt Works ..... Columbus
Jeffrey Mfg. Co. ..... Columbus
Kaufman-Lattimer Co. ..... Columbus

DAYTON CHAPTER

City Mach. & Tool Works ..... Dayton
Dayton Forging & Heat Treating Co. .... Dayton
Dayton Power & Light Co. ..... Dayton
Delco Products Co. ..... Dayton
Duriron Co., Inc. ..... Dayton
Nat. Cash Register Co. ..... Dayton
Ohio Heat Treating Co. ..... Dayton
Ohio Steel Foundry Co. ..... Springfield
Simonds Worden White Co. ..... Dayton

DETROIT CHAPTER

Bethlehem Steel Co. ..... Detroit
Blaich Co., Alfred O. ..... Detroit
Canadian Bridge Co. ..... Walkerville, Ont.
Climax Molybdenum Co. ..... Detroit
Columbia Steel & Shafting Co. ..... Detroit
Columbia Tool Steel Co. ..... Detroit
Dearborn Chemical Co. ..... Detroit
Detroit City Gas Co. ..... Detroit
Dodge Brothers ..... Detroit
Driver-Harris Co. ..... Detroit
Electric Furnace Co. ..... Detroit
Ford Co., J. B. ..... Detroit
General Alloys Co. ..... Detroit
Goddard and Goddard Co. ..... Detroit
Halcomb Steel Co. ..... Detroit
Holcroft & Co. ..... Detroit
Hudson Motor Car Co. ..... Detroit
Hupp Motor Car Corp. ..... Detroit
J. & L. Steel Corp. ..... Detroit
Ladish Drop Forge Co. ..... Detroit
Ludlum Steel Co. ..... Detroit
Melling Forging Co. ..... Lansing
Nat. Broach & Machine Co. ..... Detroit
Park Chemical Co. ..... Detroit
Peninsular Steel Co. ..... Detroit
Philfuels Co. ..... Detroit
Pitts. Crucible Steel Co. ..... Detroit
Republic Steel Corp. ..... Detroit
Rockwell Co., W. S. ..... Detroit
Roessler & Hasslacher Chem. Co. ..... Chicago
Steel City Testing Lab. ..... Detroit
Steel Treating Equip. Co. ..... Detroit
Surface Combustion Co. ..... Toledo
Surface Combustion Co. ..... Toledo
Swedish Crucible Steel Co. ..... Detroit
Timken-Detroit Axle Co. ..... Detroit
Union Drawn Steel Co. ..... Detroit
United Forge & Machine Co. ..... Detroit
Vanadium Alloys Steel Co. ..... Detroit
Vanadium Corp. of Amer. ..... Detroit
Weaver Brothers Co., The ..... Adrian
White Star Refining Co. ..... Detroit
Wilcox-Rich Corporation ..... Detroit

FORT WAYNE GROUP

International Harvester Co. ..... Ft. Wayne
No. Ind. Public Ser. Co. ..... Ft. Wayne

GOLDEN GATE CHAPTER

American Can Co. ..... San Francisco
American Forge Co ..... San Francisco
Best Steel Casting Co. ..... Oakland
Bethlehem Ship Bldg. Corp. ..... San Francisco
California Saw Works ..... San Francisco
Caterpillar Tractor Co. ..... San Leandro
Cruc. Steel Co. of Amer. ..... San Francisco
Hall Scott Motor Car Co. ..... Berkeley
Houghton & Co., E. F. ..... San Francisco
Industrial Steel Treating Co. ..... Oakland
Johnson Gear Co. ..... Berkeley
Jorgenson Co., Earle M. ..... Oakland
Knapp Co., Inc. Jas. H. ..... San Francisco
Ludlum Steel Co. ..... San Francisco
Macauley Foundry Co., H. C. ..... Berkeley
Pac. Coast Steel Co. ..... So. San Francisco
Pacific Foundry Co. ..... San Francisco
Stockton Fire Brick Co. ..... San Francisco
U. S. Steel Products Co. ..... Pittsburgh

HARTFORD CHAPTER

Carpenter Steel Co. ..... Hartford
Collins Co. ..... Collinsville
Columbia Steel Shafting Co. ..... Hartford
Cruc. Steel Co. of Amer. ..... Hartford
Fafnir Bearing Co. ..... New Britain
Firth-Sterling Steel Co. ..... Hartford
Frasse & Co., Inc. Peter A. ..... Hartford
General Alloys Co. ..... Hartford
Hart. City Gas Light Co. ..... Hartford
Hartford Elec. Light Co. ..... Hartford
Hendey Machine Co. ..... Torrington
Landers, Frary & Clark ..... New Britain
New Departure Mfg. Co. ..... Bristol
New Departure Mfg. Co. ..... Bristol
New Departure Mfg. Co. ..... Bristol
New Departure Mfg. Co. ..... Hartford
New Departure Mfg Co. ..... Meriden
Pratt & Whitney Co. ..... Hartford
Pratt & Whitney Aircraft Co. ..... Hartford
Rockwell Co., Stanley P. ..... Hartford
Souther Engineering Co., Henry ..... Hartford
Spencer Turbine Co. ..... Hartford
Standard Steel & Bearings ..... Plainville
Stanley Works ..... New Britain
Underwood Computing Mach. Co. ..... Hartford
Underwood Elliott Fisher Co. ..... Hartford
Union Drawn Steel Co. ..... Hartford
Union Mfg. Co. ..... New Britain
Universal Steel Co. ..... Windsor
Wallace Barnes Co. ..... Bristol
Whitney Mfg. Co. ..... Hartford

INDIANAPOLIS CHAPTER

Adams Co., The J. D. ..... Indianapolis
Atkins Co., E. C. ..... Indianapolis
Beach, Clarence H. ..... Indianapolis
Carpenter Steel Co. ..... Indianapolis
Cruc. Steel Co. of Amer. ..... Indianapolis
Desautels Co., Geo. O. ..... Indianapolis
General Alloys Co. ..... Indianapolis
Holliday & Co., W. J. ..... Indianapolis
Houghton & Co., E. F. ..... Indianapolis
Indpls. Power & Light Co. ..... Indianapolis
Mull, Jr., Co., J. W. ..... Indianapolis
Muncie Products Div.—Gen. Motors ..... Muncie
Ross Gear & Tool Co. ..... Lafayette

LEHIGH VALLEY CHAPTER

Bethlehem Steel Co. ..... Bethlehem
Birdsboro Steel Fdry. & Mach. Co. ..... Birdsboro
Bonney Forge & Tool Wks. ..... Allentown
Carpenter Steel Co. ..... Reading
Consumers' Gas Co. ..... Reading
Ingersoll-Rand Co. ..... Phillipsburg, N. J.
Lebanon Steel Fdry. ..... Lebanon
Penn.-N. J. Power System ..... Reading
Roller-Smith Co. ..... Bethlehem
Taylor Wharton Iron & Steel Co. ..... High Bridge, N. J.
Treadwell Engineering Co. ..... Easton

LOS ANGELES CHAPTER

Axelson Mfg. Co., Ltd. ..... Los Angeles
Bethlehem Steel Co. ..... Los Angeles
Hanford Iron Works ..... Los Angeles
Herberts Mach. & Supply Co. ..... Los Angeles
Hughes Tool Co. ..... Los Angeles
Kawin Co., Chas. C. ..... Los Angeles
Knapp, Jas. H. ..... Los Angeles
Ludlum Steel Co. ..... Los Angeles
Master Lubricants Co. ..... Los Angeles
Minder Company, J. W. ..... Los Angeles
Regan Forge & Engineering Co. ..... San Pedro
Shell Oil Co. ..... Los Angeles
Smith Booth Usher Co. ..... Los Angeles
So. Calif. Edison Co. ..... Los Angeles
Warman Steel Castings Co. ..... Los Angeles

MILWAUKEE CHAPTER

Carpenter Steel Co. ..... Milwaukee
Chain Belt Co. ..... Milwaukee
Columbia Tool Steel Co. ..... Milwaukee
Hevi Duty Electric Co. ..... Milwaukee
Mil. Elec. Ry. & Light Co. ..... Milwaukee
Mil. Gas Light Co. ..... Milwaukee
Sivyer Steel Casting Co. ..... Milwaukee
Smith Corp., A. O. ..... Milwaukee
Thurner Heat Treating Co. ..... Milwaukee
Wesley Steel Treating Co. ..... Milwaukee

MONTREAL CHAPTER

Allen & Co. of Can., Edgar ..... Montreal
Balfour & Co., Arthur ..... Montreal
Bartram, Ltd., R. W. ..... Montreal
Can. Atlas Steels ..... Montreal
Can. Car & Foundry Co. ..... Montreal
Can. Gen. Elec. Co. ..... Montreal
Can. Tube & Steel Prod. Co. ..... Montreal
Coghlin, B. W. ..... Montreal
Crane, Limited ..... Montreal
Cummings Mfg. Co., Ltd. ..... New Glasgow, N. S.
Donald & Co., Ltd., J. T. ..... Montreal
Dominion Iron & Steel Co. ..... Montreal
Hull Iron & Steel Foundries ..... Hull
Joliette Steel, Ltd. ..... Joliette
Production Materials, Ltd. ..... Montreal
Shawinigan Stainless Steel and Alloys, Ltd. ..... Montreal

NEW HAVEN CHAPTER

Bellis Heat Treating Co. ..... Branford
Bristol Co., The ..... Waterbury
Chase Companies, Inc. ..... Waterbury
Cruc. Steel Co. of Amer. ..... New Haven
Eastern Mach. Screw Corp. ..... New Haven
Geometric Tool Co. ..... New Haven
Heppenstall Co. ..... Bridgeport
Millers Falls Co. ..... West Haven
New Haven Clock Co. ..... New Haven
New Haven Gas Light Co. ..... New Haven
O. K. Tool Co. ..... Shelton
Remington Arms Co., Inc. ..... Richport
Seymour Mfg. Co. ..... Seymour
S. O. & C. Co. ..... Ansonia
Southington Hardware Co. ..... Southington
Thompson & Son Co. ..... New Haven
Wallace & Sons Mfg. Co. ..... Wallingford
Waterbury Farrell Fdry. & Mach. Co. .. Waterbury

NEW JERSEY CHAPTER

American Cyanamid Co. ..... New York
American Gas Furn. Co. ..... Elizabeth
Ames & Co., W. ..... Jersey City
Bennett Insured Steel Treating Co. ..... Newark
Bethlehem Steel Co. ..... Elizabeth
Brown Instrument Co. ..... Newark
Carborundum Co. ..... Perth Amboy
Carrier Engineering Corp. ..... Newark
Coe & Co., Jas. A. ..... Newark
Columbia Tool Steel Co. ..... Newark
Crocker-Wheeler Elec. Mfg. Co. ..... Ampere
Cruc. Steel Co. of Amer. ..... Harrison
Driver-Harris Co. ..... Harrison
Driver-Harris Co. ..... Harrison
Edgcomb Steel Corp. ..... Newark
European Color & Chem. Co. ..... Weehawken
Fasse & Co., Inc., P. A. ..... New York
General Alloys Co. ..... New York
Gould & Eberhardt ..... Newark
Halcomb Steel Co. ..... New York
Heller Bros. Co. ..... Newark
Heppenstall Co. ..... Jersey City
Hyatt Bearings Div., Gen. Motors Co. ..... Harrison
Jessop & Sons, Inc., Wm. ..... New York
Johnson Forging Works ..... Newark
Kenny, Peter F. ..... Maplewood
Kraeuter & Co., Inc. ..... Newark
McWilliams Forge & Steel Wks. ..... Jersey City
Mergott Co., J. E. ..... Newark
Monroe Calculating Mach. Co. ..... Orange
Morrison, Edward ..... Philadelphia
Nat. Lock Washer Co. ..... Newark
Otis Elevator Co. ..... Harrison
Pittsburgh Cruc. Steel Co. ..... N. Y.
Producto Mach. Co. ..... Bridgeport, Conn.
Public Service Corp. ..... Newark
Quigley Co., Inc. ..... New York
Republic Steel Corp. ..... New York City
Riverside Steel Casting Co. ..... Newark
Rockwell Co., W. S. ..... New York
Singer Mfg. Co. ..... Elizabethport
Smith Mfg. Co., A. P. ..... East Orange
Stewart Hartshorn Co. ..... East Newark
Surface Combustion Co., Inc. ..... N. Y.
Swan-Finch Oil Corp ..... Newark
U. S. Tool Co., Inc. ..... Ampere
Ward Sons Co., Edgar T. ..... Newark
Westinghouse Elec. & Mfg. Co. ..... Newark
Westinghouse Lamp Co. ..... Bloomfield
Weston Elec. Inst. Corp. ..... Newark
Wiss & Sons Co., J. ..... Newark

NEW YORK CHAPTER

Ackerlind Steel Co., Inc. ..... New York
Allen, Roy M. ..... Bloomfield, N. J.
American Cyanamid Co. ..... Linden, N. J.
American Gas Assoc. ..... New York
Amer. Gas Furnace Co. ..... Elizabeth, N. J.
Babcock & Wilcox Co. ..... New York
Bethlehem Steel Co. ..... New York
Climax Molybdenum Co. ..... New York
Cruc. Steel Co. of Amer. ..... New York
De Laval Separator Co. ..... Poughkeepsie
General Alloys Co. ..... New York
International Nickel Co. ..... New York
Kasenit Company ..... New York
Leitz, Inc., E. ..... New York
Midvale Co. ..... New York
Rockwell Co., W. S. ..... New York
Rosenberg, Hyman ..... New York
Russell, Burdsall & Ward Bolt & Nut Co. ..... Port Chester
Technical Service ..... New York
Uddeholm Co. of America ..... New York
Washburn Wire Co., Inc. ..... New York
Wilson-Maeulen Co., Inc. ..... New York

NORTHWEST CHAPTER

Aluminum Industries, Inc. ..... St. Cloud
Amer. Hoist & Derrick Co. ..... St. Paul
Arrow Head Steel Prod. Co. ..... Minneapolis
Auto Engine Works, Inc. ..... St. Paul
Brown & Bigelow, Inc. ..... St. Paul
Caterpillar Tractor Co. ..... Minneapolis
Electric Mach. Mfg. Co. ..... Minneapolis
Johnston Mfg. Co. ..... Minneapolis
Mahr Mfg. Co. ..... Minneapolis
Mpls. Electric Steel Casting Co. ..... Minneapolis
Mpls. Honeywell Regulator Co. ..... Minneapolis
Mpls. Steel & Machinery Co. ..... Minneapolis
Riverside Iron Wks., Ltd. ..... Calgary, Alta.
St. Paul Foundry Co. ..... St. Paul
Toro Manufacturing Co. ..... Minneapolis
Western Cruc. Steel Casting Co. ..... Mpls.

ONTARIO CHAPTER

Babcock-Wilcox & Goldie-McCulloch, Ltd. .... Galt
Balfour & Co., Arthur ..... Hamilton
Barber Machinery Co. ..... Toronto
Beatty Brothers, Ltd. ..... Fergus
Booth Co., Ltd., W. E. ..... Toronto
Burlington Steel Co. ..... Hamilton
Burlington Steel Co. ..... Hamilton
Burlington Steel Co. ..... Hamilton
Burlington Steel Co. ..... Hamilton
Canada Illinois Tools, Ltd. ..... Toronto
Can. Atlas Steels, Ltd. ..... Welland
Canadian General Elec. Co. ..... Toronto
Can. Inspection & Testing Co. ..... Toronto
Cockshutt Plow Co., Ltd. ..... Brantford
Dominion Fdries. & Steel, Ltd. ..... Hamilton
Frankel Bros., Ltd. ..... Toronto
Frost Steel & Wire Co. ..... Hamilton
Harrison Tool Co., H. A. ..... Toronto
Hi-Speed Tools, Ltd. ..... Galt
Hydro Elec. Power Commission ..... Toronto
Jessop & Sons, Ltd., Wm. ..... Toronto
Norton Co. of Canada ..... Hamilton
Ont. Research Foundation ..... Toronto
Ont. Research Foundation ..... Toronto
Peerless Engineering Co. ..... Toronto
Potts Pattern & Mach. Co. ..... Toronto
Precision Tool Wks., Ltd. ..... Toronto
Production Materials Co. ..... Toronto
Pyrene Mfg. Co. of Canada ..... Toronto
Ry. & Power Engineering Corp. ..... Toronto
Sangamo Electric Co. ..... Toronto
Steel Co. of Canada ..... Hamilton
Toronto Hydro Elec. System ..... Toronto
Volta Mfg. Co., Ltd. ..... Welland
Wallace Barnes Co. ..... Hamilton

PHILADELPHIA CHAPTER

Ajax Metal Corp. ..... Philadelphia
Amer. Engineering Co. ..... Philadelphia
Atlantic Steel Castings Co. ..... Chester
Brown Instrument Co. ..... Philadelphia
Budd Mfg. Co., Edw. G. ..... Philadelphia
Camden County Vocational School ..... Merchantville, N. J.
Cann & Saul Steel Co. ..... Philadelphia
Carpenter Steel Co. ..... Philadelphia
Delaware Valley Forge Co. ..... Philadelphia
Disston & Sons, Inc., Henry ..... Philadelphia
Edgcomb Steel Co. ..... Philadelphia
Fox Gun Co., A. H. ..... Philadelphia
Frasse & Co., Peter A. ..... Philadelphia
Fulmer & Gibbons ..... Philadelphia
Houghton & Co., E. F. ..... Philadelphia
Illingworth Steel Co., John ..... Philadelphia
Leeds & Northrup Co. ..... Philadelphia
Midvale Co. ..... Nicetown, Philadelphia
Morris, Wheeler & Co., Inc. ..... Philadelphia
Philadelphia Electric Co. ..... Philadelphia
Philadelphia Gas Works Co. ..... Philadelphia
Plumb, Fayette R., Inc. ..... Philadelphia
Potts & Co., Horace A. ..... Philadelphia
Rowland, Inc., Wm. & Harvey ..... Philadelphia
Ryan, Scully & Co. ..... Philadelphia
Schutte & Koerting Co. ..... Philadelphia
Standard Pressed Steel Co. ..... Jenkintown
Steinmetz & Co., Inc. ..... Philadelphia
Stokes & Smith Co. ..... Philadelphia
Summerill Tubing Co. ..... Bridgeport
Thwing Instrument Co. ..... Philadelphia
Trent & Co., Harold E. ..... Philadelphia
Ward's Sons Co., Edgar T. ..... Philadelphia
Wiedemann Machine Co. ..... Philadelphia
Wood Steel Co., Alan ..... Philadelphia

PITTSBURGH CHAPTER

Aluminum Co. of Amer. ..... New Kensington
Braeburn Alloy Steel Corp. ..... Braeburn
Duquesne Light Co. ..... Pittsburgh
Duquesne Steel Fdry Co. ..... Coraopolis
Firth-Sterling Steel Co. ..... McKeesport
Fisher Scientific Co. ..... Pittsburgh
Flannery Mfg. Co. ..... Pittsburgh
Ft. Pitt Steel Castings Co. ..... McKeesport
Hall & Pickles, Ltd. ..... Manchester, Eng.
Heppenstall Co. ..... Pittsburgh
Houghton & Co., E. F. ..... Pittsburgh
Jones & Laughlin Steel Corp. ..... Pittsburgh
Latrobe Elec. Steel Co. ..... Latrobe
Mackintosh-Hemphill Co. ..... Pittsburgh
Mesta Machine Co. ..... Pittsburgh
Nat. Drawn Steel Co. ..... E. Liverpool, O.
Oliver Iron & Steel Co. ..... Pittsburgh
Pittsburgh Rolls Corp. ..... Pittsburgh
Pittsburgh Steel Co. ..... Monessen
Refined Steel Products Co. ..... Pittsburgh
Rodman Chemical Co. ..... Orona, Pa.
Union Drawn Steel Co. ..... Beaver Falls
Union Steel Castings Co. ..... Pittsburgh
Union Switch & Signal Co. ..... Swissvale
United Engineering & Foundry Co. .... Vandergrift
Vanadium-Alloys Steel Co. ..... Latrobe
Vanadium Corp. of Amer. ..... Bridgeville
Vulcan Cruc. Steel Co. ..... Aliquippa
Westinghouse Elec. & Mfg. Co. ..... Mansfield, O.

RHODE ISLAND CHAPTER

Brown & Sharp Mfg. Co. ..... Providence
Crosby Co., J. D. ..... Pawtucket
Hayes, C. I. ..... Providence
Narragansett Elec. Co. ..... Providence
Slocomb Company, J. T. ..... Providence
Vanadium Alloys Steel Co. ..... Providence
Victor Ring Traveler Co. ..... Providence
Washburn Wire Co. ..... Phillipsdale

ROCHESTER CHAPTER

Amer. Laundry Mach. Co. ..... Rochester
Bausch & Lomb Optical Co. ..... Rochester
Brace-Mueller Huntley, Inc. ..... Rochester
Burke Steel Co., Inc. ..... Rochester
Davenport Mach. Tool Co. ..... Rochester
Gleason Works ..... Rochester
High Speed Hammer Co. ..... Rochester
North East Appliance Corp. ..... Rochester
Ritter Dental Mfg. Co. ..... Rochester
Rochester Gas & Elec. Corp. ..... Rochester
Symington Company ..... Rochester
Taylor Instrument Co. ..... Rochester

ROCKFORD CHAPTER

Barber-Colman Co. ..... Rockford
Barnes Co., W. F. & John ..... Rockford
Eclipse Fuel Engineering Co. ..... Rockford
Elco Tool & Screw Corp. ..... Rockford
Ingersoll Milling Mach. Co. ..... Rockford
Mattison Machine Works ..... Rockford
Mechanics Machine Co. ..... Rockford
National Lock Co. ..... Rockford
Rockfd. Gas Lt. & Coke Co. ..... Rockford
Rockfd. Screw Prod. Co. ..... Rockford
Ryerson & Son, Inc., J. T. ..... Rockford

SCHENECTADY CHAPTER

American Locomotive Co. ..... Schenectady
General Electric Co. ..... Schenectady
Ludlum Steel Co. ..... Watervliet

SOUTHERN TIER CHAPTER

Amer. La France & Foamite Corp. ..... Elmira
Eclipse Machine Co. ..... Elmira Hts.
Elmira Water, Lt. & R. R. Co. ..... Elmira
Ingersoll-Rand Co. ..... Athens, Pa.
Ingersoll-Rand Co. ..... Athens, Pa.
Ingersoll-Rand Co. ..... Athens, Pa.
Ingersoll-Rand Co. ..... Painted Post
Internat'l Business Machine Co. .. Endicott, N. Y.
Kennedy Valve Mfg. Co. ..... Elmira
Morrison Mach. Prod. Inc. ..... Elmira
Willys-Morrow Co. ..... Elmira
Willys-Morrow Co. ..... Elmira

SPRINGFIELD CHAPTER

Chapman Valve Mfg. Co. ..... Indian Orchard
Moore Drop Forging Co. ..... Springfield
Perkins Mach. & Gear Co. ..... Springfield
Springfield Gas Light Co. ..... Springfield
United Electric Light Co. ..... Springfield
Vanadium-Alloys Steel Co. ..... Springfield

ST. LOUIS CHAPTER

Bromwich Supply Co., E. W. ..... St. Louis
Carpenter Steel Co. ..... St. Louis
Century Electric Co. ..... St. Louis
Davis Boring Tool Co. ..... St. Louis
Granite City Steel Co. ..... Granite City, Ill.
Houghton & Co., E. F. ..... St. Louis
Laclede Gas Light Co. ..... St. Louis
Laclede Steel Co. ..... Alton, Ill.
Leschen & Sons Rope Co. ..... St. Louis
Ludlum Steel Company ..... St. Louis
Ryerson & Son, Inc., Jos. T. ..... St. Louis
Scullin Steel Co. ..... St. Louis
So. Manganese Steel Co. ..... St. Louis
St. Louis Screw & Bolt Co. ..... St. Louis
Union Elec. Lt. & Power Co. ..... St. Louis
Western Cartridge Co. ..... E. Alton, Ill.

SYRACUSE CHAPTER

Brace-Mueller-Huntley, Inc. ..... Syracuse
Brown-Lipe-Chapin Co. ..... Syracuse
Cruc. Steel Co. of Amer. ..... Syracuse
Halcomb Steel Co. ..... Syracuse
New Process Gear Co., Inc. ..... Syracuse

TRI CITY CHAPTER

Bettendorf Co. ..... Bettendorf, Ia.
Deere & Co. ..... Moline
French & Hecht ..... Davenport
International Harvester Co. ..... Moline
Moline Tool Co. ..... Moline
People's Power Co. ..... Moline
Williams, White & Co. ..... Moline

WASHINGTON-BALTIMORE CHAPTER

Black & Decker Mfg. Co. ..... Baltimore
Cruc. Steel Co. of Amer. ..... Baltimore
Dearborn Chemical Co. ..... New York
Gathmann Engineering Co. ..... Baltimore
Poole Engineering & Mach. Co. ..... Baltimore
Rustless Iron Corp. of Amer. ..... Baltimore

WORCESTER CHAPTER

Amer. Steel & Wire Co. ..... Worcester
Arter Grinding Mach. Co. ..... Worcester
Bath & Co., John ..... Worcester
Curtis & Marble Mach. Co. ..... Worcester
Heald Machine Co. ..... Worcester
Jessop Steel Co. ..... Worcester
Johnson & Basset, Inc. ..... Worcester
Johnson Steel & Wire Co. ..... Worcester
Leland-Gifford Co. ..... Worcester
Morgan Construction Co. ..... Worcester
Norton Co. ..... Worcester
Whitinsville Spinning Ring Co. ..... Whitinsville
Worcester Gas Light Co. ..... Worcester
Wyman-Gordon Co. ..... Worcester

YORK GROUP

Pennsylvania Gas & Elec. Co. ..... York

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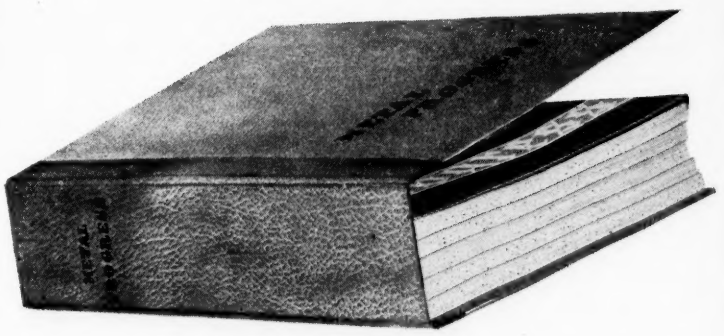

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GOLD GATE HONORS SUSTAINING FIRMS

Has Varied Program of Talks and Entertainment for Guests

By R. S. Hirst

The second annual Sustaining Members' Night of Golden Gate chapter was held Monday, Dec. 15, at the Engineers' Club, San Francisco.

This event is regarded by the friends and members of the chapter as the outstanding get together meeting of the year. The sustaining members are the guests of the chapter, and this year we had the great pleasure of having with us W. H. Eisenman, secretary of the society.

After the dinner, which 87 attended, we retired to the parlor of the club, so the dining room could be arranged for the meeting. Mr. Frank B. Drake welcomed the sustaining members and told what their support of the Chapter's Educational Work meant to the Chapter and the Bay District.

Mr. Grubb then introduced Sergeant McGee of the San Francisco Dpt. of Police and his troup of seven San Francisco Policemen who gave us a forty minute entertainment in self-defense methods as taught to every member of the force, sleight of hand, singing and piano playing.

The following were next introduced, and each gave a short address:

Barney Google, an old member who has been east for a while, but is again in business in Oakland; Dr. Crook, of Stanford University, on the chapter's educational work and the benefits to the metal trades; Geo. A. Nelson, director of the laboratory course in practical metallurgy, reported on the term just closing and the students' work.

Mr. Roberts, principal and director of the Technical Department of the Humboldt Evening High School, spoke on the course sponsored by Golden Gate chapter, and gave a short review of the technical work in the Bay section in the last 35 years.

Mr. Grubb then introduced Mr. Eisenman, the National Secretary, who responded in his usual entertaining way. He first congratulated the men of the graduating class, giving credit to Golden Gate chapter for the part they are taking in the educational work of the A. S. S. T. He then spoke of the sustaining members' part in the Society and the important place they hold in assisting to place the A. S. S. T. in its present position.

He also called attention to the 1931 National Western Metal Congress and National Western Metal and Machinery Exposition and asked each man present to consider himself an advertising man for the show.

NICKEL CAST IRON TALK AT NORTHWEST

J. S. Vanick Interests Meeting

By A. C. Forsyth

The November meeting of the Northwest chapter was held Thursday evening, Nov. 20, in the club rooms of the Manufacturers Association of Minneapolis. The meeting was well attended. J. S. Vanick of the International Nickel Co. very ably gave the lecture on "Nickel as an Alloying Element in Cast Iron and Steel."

Mr. Vanick began his lecture with a history of the use of nickel as an alloying element in connection with steel and iron production. The first commercial nickel steel was produced about 1885, and the first commercial nickel iron about 1925, although nickel cast iron had been known a number of years before commercial production was attempted. Nickel is one of the oldest of steel alloying elements and has a very wide variety of uses.

The speaker then discussed the use of nickel in stainless steels and electrical resistance alloys and emphasized the fact that, although the cost was higher, the superior properties obtained were well worth the additional expense. He also took up the importance of nickel in invar, which is used in pistons, clock springs, thermostats, measuring tapes, etc., where a small coefficient of expansion is necessary.

In regard to nickel steel alloys Mr. Vanick discussed a very wide variety of commercial steels which depended on nickel for certain properties that make them superior for special types of service.

An outline and discussion on the use of nickel in a special austenitic nickel cast iron concluded the lecture. This alloy was found to have many outstanding properties, a few of which are as follows, very high corrosion resistance, heat resistance, resistance to scaling, low growth and small decrease in tensile strength at high temperatures.

This Is Not China

Chinatown, not China. This street looks deceivingly like the Orient, but is in reality one of San Francisco's famous Chinatown streets.

CLEVELANDERS SEE MOVIES OF STEEL

Pictures of Plain Carbon and Alloy Steel Making Entertain

By W. E. Benninghoff

The regular monthly meeting of Cleveland chapter, American Society for Steel Treating, was preceded by the customary dinner in Kaase's Restaurant, at which Dr. A. Caswell Ellis of Cleveland College gave a coffee-talk on "The Relation of Adult Education to Leisure". Dr. Ellis stated that not only can you teach an old dog new tricks, but that he learns more rapidly and better than a youngster. He also stated that we do not have a mental youth, mental middle age, etc., but a series of mental youths along different lines at all ages.

The work of the adult school is to develop these mental youths and also train those who have not had training as well as to continue with the training of those who had been trained along some particular line. About fifty members and guests thoroughly enjoyed the humor and good sense Dr. Ellis put into his coffee talk.

The regular meeting held in the Engineering Society rooms consisted mainly of a film "Making It Tough", a movie showing the making of steel which was produced by the Bureau of Mines with the cooperation of the Central Alloy division of the Republic Steel Corp.

The film portrayed the blast furnace making pig and the open hearth doing the refining. The resulting ingots were shown in their trip to the soaking pits, blooming mill, trimmers, rolls, cooling pits and chippers. Finally the billets were reheated and rolled into bars ready for shipment.

Another section of the film showed the use of the electric furnace in melting, including the charging of scrap, addition of alloys, etc. The process of stainless steel was shown, including the final polishing of the sheets to a mirror-like finish.

The final section of the film showed tests to which samples were put in the laboratory, including bending, twisting, "slimmy" and corrosion tests. The film closed on the portrayal of the many different ways in which steel is used.

W. W. Leffler of the Republic Steel Corp. then answered questions on details of subjects portrayed in the film. The majority showed a decided interest in the stainless steel process.

LABORATORIANS ARE NEEDED

Civil Service Board Asks Applications For Posts at Wright Field, Dayton

Word has been received from the United States Civil Service Commission that laboratorians (engineering) are wanted at Wright Field in Dayton, Ohio. The salary ranges from $1800 to $2100 a year and duties include testing and recording data and writing reports.

Applicants must have completed at least three years in a college or university of recognized standing, including 18 semester-hours of physics and engineering, and at least one year of physical or engineering laboratory work. Applicants should apply to the secretary of the Board of U. S. Civil Service Examiners, Wright Field, Dayton, Ohio, for form 2600 and for further information. Such application should be made before January 23.

A folder describing "Nittany Free Turning Brass Rods" has been issued by the Titan Metal Manufacturing Co. of Bellefonte, Pa.

TALK ON NITRIDING DRAWS BIG CROWD

Sergeson Addresses Largest Recent Springfield Meeting

By T. P. Jones

The Nov. meeting of the Springfield chapter was one of the most successful and well attended meetings that we have enjoyed in recent years. It is of some interest to note that the attendance was almost three times as large as the membership of the chapter. But we must admit that this was due to the interest created by the announcement that Robert Sergeson, research metallurgist of the Republic Steel Corp., would talk on "Nitriding".

Mr. Sergeson traced a general outline of the development of the nitriding process from the work done by Dr. Fry to the methods used today in the commercial production of nitrided parts.

His description of the nitriding process itself was illustrated with lantern slides showing modern furnace construction with effective methods for circulation of ammonia gas, heat and the sealing of nitriding containers.

Mr. Sergeson also spoke of the deterioration of pots and the loss of hardness depth of case and other undesirable features that occur in long continued use of containers, and how this can be remedied.

Considerable discussion followed Mr. Sergeson's presentation, and became very warm when someone asked Mr. Sergeson a question as to whether there was any deformation or growth of machined parts after nitriding, and some very interesting arguments were presented for both sides of the question.

After the discussion and the award of the attendance prize to Mr. Roger Mulvenna, a guest, the meeting closed with an expression of thanks to the speaker for the very fine talk he presented.

Attendance at the dinners preceding the meetings has been considerably larger this year, and we hope that this will continue as we think that this contributes considerably to the success of the meetings and previous acquaintance with the speaker at the dinner seems to stimulate discussion at the meeting.

NORTHWEST STUDIES THE CR-NI STEELS

Jerome Strauss Tells Chapter Character of the Alloys

By Arthur C. Forsyth

The Northwest chapter, at its December meeting, was favored by a very interesting and instructive talk on stainless and heat resisting steels, delivered by Jerome Strauss of the Vanadium Corp. of America. His talk was well received and everyone carried away something new and interesting.

Mr. Strauss' lecture was illlustrated by slides of diagrams, characteristic microstructures and data tables, the latter showing the effect of temperature and corrosion on various allovs. He began with the ternary diagram of iron, nickel and chromium and stressed in particular, first, the iron rich portion, second the high chromium with low nickel and finally the very high nickel-chromium alloys, including as he went along, the effect of other elements such as Si, W, Mo, V, etc.

Under the chromium-iron alloys the speaker discussed various alloys from the 6-14 per cent chromium range with various carbon content as being used extensively at low temperatures principally for cutlery and structural steels.

He discussed the rapid grain growth of certain chromium steels through the high temperature range and gave the properties to be expected. Sulphur was found to increase machinability accompanied by a decrease in tensile strength. Alloys containing 25 to 30 per cent chromium and 1.00 to 1.40 C could be rolled and used at high temperature (2000° F.) with good resistance to sulphur gases.

The addition of nickel to chromium-iron alloys gives austenite in the 18-8 type. This alloy can be cold formed, welded producing a fine structure, and has very good corrosion resisting properties. The addition of nickel has its greatest advantage at higher temperatures. Nickel - chromium alloys have very good corrosion resistance with respect to sulphuric acid or nitric acid and fair with respect to hydrochloric acid.

In concluding, Mr. Strauss mentioned the 70 per cent Ni and 30 per cent Cr, stating that this alloy gave the best corrosion resistance in commercial alloys, and that many new alloys would probably be discovered in this field.

One of San Francisco's Famous Spots

Reminiscent of the design on old fashioned blue plates is this pretty garden spot near San Francisco which will be visited by many metal men next month.

CORROSION, HEAT RESISTING STEELS TOPICS AT TRI-CITY

John S. Ewing is Guest Speaker

By C. B. Sadtler

John S. Ewing, metallurgist of the Crucible Steel Co. of America, favored the Rockford chapter with a lecture on corrosion and heat resisting steels, at the regular monthly meeting, Dec. 10, in the Faust Hotel.

Mr. Ewing gave a very complete picture of the essential physical and corrosion resistent properties of the various analyses which have commercial importance. The great diversity in the application of these materials has made necessary a rather large number of compositions, each of which is better than the others for particular types of service.

There has been, in spite of these conditions, considerable standardization as exemplified by the 18-8 type. While new compositions will undoubtedly make their appearance in the near future, according to Mr. Ewing, there will be still further progress made in the direction of standardization.

A number of instances were related by Mr. Ewing of the difficulties which had been experienced in fabricating plates and flanges by riveting and welding methods. Very radical changes were found to be necessary from the practice which was satisfactory for older types of steel. Much of the recent widespread use of these special steels can be attributed to the development of successful fabricating methods.

NEW GAS RESEARCH PLANNED

American Gas Association Will Sponsor Further Research at Ann Arbor

Following its plan of systematically conducting research in the application of heat in all the important metallurgical fields, the Committee on Industrial Gas Research of the American Gas Association, F. J. Rutledge, chairman, has just had contracts signed for two new projects. These are: Research in Deterrent Effect of Scale in Gas Fired Furnaces at Heat Treating Temperatures, and Research in Factors Affecting Short Cycle Malleableizing.

These two projects will be conducted for the Committee by the Department of Engineering Research of the University of Michigan, Ann Arbor. The research in the Deterrent Effect of Scale at Heat Treating Temperatures logically follows the research in Scaling at Forging Temperatures, which is nearly complete so far as laboratory work is concerned.

J. T. RYERSON CO. EXPANDS

Acquires Good Will and Sheet Metal Stock of Part of Boston Concern

Joseph T. Ryerson & Son, Inc., has recently acquired the stock and good will of the sheet metal division of the Richards Co., Inc., Boston, Mass.

The Richards Co., founded in 1812, has built up a very good business during its 119 years of importing and distributing nonferrous metals, rolling mill products and metal workers' supplies. It will continue in business, specializing in pig metals.

Stocks taken over by Ryerson include Armco black and galvanized sheets, lead coated, galvannealed, and Bay State blue sheets.

Descriptions of the compositions and uses of the ferro-alloys and metals distributed through the Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, is contained in the third edition of that company's booklet.

RECORD TURBINES NOW BEING BUILT

Will Run Largest Generator Yet Built at 1800 r. p. m.

Two turbine generators that will set several records for capacity and size are being constructed at the Schenectady works of the General Electric Company for installation in the Hudson Avenue station of the Brooklyn Edison Company. One will be installed in September, 1931, and the other in April, 1932.

Each turbine will be of tandem-compound construction, with double flow in the low-pressure cylinder, and will drive a single generator of 160,000 kilowatts capacity at 0.8 power factor, with a maximum output of 200,000 kilovolt-amperes. The unit is the largest single-shaft machine operating at 1800 revolutions per minute. Without auxiliaries or attachments the combined weight of each turbine and generator will be more than a thousand tons. The turbines are designed for steam conditions of 400 pounds gauge pressure, .730 degrees Fahrenheit total temperature, and one inch absolute back pressure. Provision is made for bleeding steam at two stages for heating the feed water to a temperature of 270° F. The compactness of the unit is shown by the fact that an output of almost 100 kilovolt-amperes is obtained from one square foot of floor area.

The steam is admitted to the turbine through five control valves which open in sequence and therefore result in a very flat load curve and high economy at partial loads. The turbine will operate from half to full load with a change in efficiency of less than two per cent. The steam exhausts from the high-pressure element into the double-flow low-pressure element through two cross-over pipes which have a total cross-sectional area of 46 square feet.

When the turbine is operating at full load it requires approximately 800 tons of steam per hour. This steam is delivered to the turbine through two steam lines 22 inches in diameter. The turbine generator will consume its own weight in steam every 75 minutes.

In each stage of the turbine the nozzle diaphragms first accelerate the steam to approximately 1600 feet a second velocity, and then direct this high-velocity steam into the rapidly moving buckets of the turbine wheels. In this way the heat energy in the steam is converted into mechanical energy, and the steam which enters the turbine at a temperature of 730° F. is exhausted in a small fraction of a second with its temperature reduced to 80° F. Because of this rapid conversion of heat into work, the turbine may be considered as a gigantic refrigerating machine. Thirteen tons of steam are reduced in temperature every minute from 730° F. to 80° F.

The generator that will be driven by this turbine is an outstanding engineering achievement, for it is the largest single generator in the world. Rated at 160,000 kilowatts, 16,500 volts and 7000 amperes, it operates at 1800 revolutions per minute. As it is an 0.8 power factor machine, the full load output of 200,000 kilovolt-amperes will be considerably greater than the output of the 160,000 kilowatt, 160,000-kilovolt-ampere generator now operating in the East River station of the New York Edison Company. Seventy-one of the new generators, operated continuously for one year, would generate close to 100 billion kilowatt-hours, which quantity slightly exceeds the total electric output of the United States for all purposes during 1929.